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Matthew Jones House

Historic Maintenance and Repair Manual

Adam D. Smith and Sunny E. Adams

August 2014



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Historic Maintenance and Repair Manual

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Final report

Approved for public release; distribution is unlimited.

Prepared for Environmental Element
Civil Engineer Division, 733d Mission Support Group
Joint Base Langley-Eustis (Eustis)
1407 Washington Blvd.
Fort Eustis VA 23604

Under Project # 396574, "Matthew Jones House Maintenance & Repair Manual."

Abstract

The Matthew Jones House is located on Joint Base Langley-Eustis (Eustis), Virginia. The house is a Virginia Historic Landmark (121-0006) and also listed on the National Register of Historic Places (#69000342). The house is now being used as an architectural-study museum with 90 architectural features labeled as teaching points. The structure illustrates the architectural transition from the post-medieval vernacular to the Georgian style to the Victorian style. All buildings, especially historic ones, require regular planned maintenance and repair. The most notable cause of historic building element failure and/or decay is not the fact the historic building is old, but rather it is caused by an incorrect or inappropriate repair and/or basic neglect of the historic building fabric. This document is a maintenance manual compiled with as-is conditions of construction materials of the Matthew Jones House. The Secretary of Interior Guidelines on rehabilitation and repair per material are discussed to provide the cultural resources managers a guide to maintain this historic building. This report satisfies Section 110 of the National Historic Preservation Act (NHPA) of 1966 as amended and will help the Joint Base Langley-Eustis, Fort Eustis Cultural Resources Management to manage this historic building.

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Executive Summary

The Matthew Jones House is located on the northwest bank of Mulberry Island. The structure illustrates the transition of architectural styles from the post-medieval vernacular to Georgian to Victorian. It was originally constructed as a one-and-a-half-story building. There is significant evidence that the building was originally of frame construction (Period I, ca. 1725) and ca. 1730, it was heavily rebuilt in brick (Period II). All that survives from the Period I house are four framing members and the two chimneys. In 1893 (Period III), the structure was given a full second floor, and the chimney stacks were lengthened to accommodate the modification.

In 1940, a measuring project was undertaken to record the Matthew Jones House under the Historic American Building Survey (HABS); however, a more detailed HABS inventory form was completed in 1959 with drawings and photographs. The Matthew Jones Home was declared a Virginia Historic Landmark in April 1969 and was placed on the National Register of Historic Places in June 1969. In 1991, an archaeological, historical, and architectural evaluation of the structure was conducted by staff of the William and Mary Center for Archaeological Research. A complete background study for use in developing a historic preservation plan for the Matthew Jones House was developed to manage and maintain the structure.

Realizing the historic significance of the structure, the Army Corps of Engineers District in Norfolk, Virginia, raised funding to preserve the house and turn it into an architectural-study museum. The museum project began in 1993 and was finished later that year, with a grand opening held May 21, 1994. Since then, Joint Base Langley-Eustis, Fort Eustis Cultural Resources Management (CRM) has been maintaining the structure as an adaptively reused structure that serves as one of the focal points for public interpretation and as a teaching tool. The home boasts displays describing the history of the home, and the house is labeled with numbered plaques that annotate significant architectural elements of the home.

This report satisfies Section 110 of the National Historic Preservation Act (NHPA) of 1966 as amended and will help the Joint Base Langley-Eustis, Fort Eustis CRM in managing this historic building.

All buildings, especially historic ones, require regular planned maintenance and repair. The most notable cause of historic building element failure and/or decay is not due to the fact that the historic building is old, but rather is caused by an incorrect or inappropriate repair and/or basic neglect of the historic building fabric.

Maintaining historic buildings and keeping a log of completed repairs and maintenance can help in:

- reducing the cost of maintenance in the long run;
- increasing the life of the building and its elements;
- the efficient use of the building and its elements;
- safety and security; and
- compliance with federal and Department of Defense historic preservation regulations.

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Preface

This study was conducted for Joint Base Langley-Eustis, Virginia, under Project No. 396574, “Matthew Jones House Maintenance & Repair Manual.” The technical monitor was Dr. Christopher McDaid, Cultural Resources Manager.

The work was performed by the Land and Heritage Conservation Branch (CN-C) of the Installations Division (CN), U.S. Army Engineer Research and Development Center – Construction Engineering Research Laboratory (ERDC-CERL). At the time of publication, Dr. Michael Hargrave was Chief, CEERD-CN-C; and Ms. Michelle Hanson was Chief, CEERD-CN. The Deputy Director of ERDC-CERL was Dr. Kirankumar Topudurti, and the Director was Dr. Ilker Adiguzel.

COL Jeffrey R. Eckstein was the Commander of ERDC, and Dr. Jeffery P. Holland was the Director.

Unit Conversion Factors

Multiply	By	To Obtain
feet	0.3048	meters
inches	0.0254	meters

Abbreviations

Term	Meaning
CED	Civil Engineering Division
CRM	Cultural Resources Management
HAER	Historic American Engineering Record
HABS	Historic American Buildings Survey
HVAC	heating, ventilation, and cooling
NHPA	National Historic Preservation Act
SHPO	State Historic Preservation Office

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1 Introduction

1.1 Background

The Matthew Jones House is located on the northwest bank of Mulberry Island. The structure illustrates the transition of styles from the post-medieval vernacular to Georgian to Victorian. It was originally constructed as a one-and-a-half-story building. There is significant evidence that the building was originally of frame construction (Period I, ca. 1725) and ca. 1730, it was heavily rebuilt in brick (Period II). All that survives from the Period I house are four framing members and the two chimneys. In 1893 (Period III), the structure was given a full second floor, and the chimney stacks were lengthened to accommodate the modification.

In 1940, a measuring project was undertaken to record the Matthew Jones House under the Historic American Building Survey (HABS); however, a more detailed HABS inventory form was completed in 1959 with drawings and photographs.¹ The Matthew Jones Home was declared a Virginia Historic Landmark in April 1969 and was placed on the National Register of Historic Places in June 1969. In 1991, an archaeological, historical, and architectural evaluation of the structure was conducted by staff of the William and Mary Center for Archaeological Research.² A complete background study for use in developing a historic preservation plan for the Matthew Jones House was developed to manage and maintain the structure.

Realizing the historic significance of the structure, the Army Corps of Engineers District in Norfolk, Virginia, raised funding to preserve the house and turn it into an architectural-study museum. The museum project began in 1993 and was finished later that year, with a grand opening held May 21, 1994. Since then, Joint Base Langley-Eustis, Fort Eustis Cultural Resources Management (CRM) has been maintaining the structure as an adaptively reused structure that serves as one of the focal points for public

¹ Historic American Buildings Survey (HABS). "Matthew Jones House, Warwick County, Virginia." HABS No. VA-163, HABS VA-95-LEHA 1-. (Richmond, VA: Historic American Buildings Survey, Grace Securities Building – Euge Bradbury, Architect in Charge, 1959).

² Donald W., Linebaugh, Willie Graham, Vanessa Elizabeth Patrick (William and Mary Center for Archaeological Research). *A Preservation Plan for the Matthew Jones House, Fort Eustis, Virginia.* (Williamsburg, VA: The College of William and Mary, 1991).

interpretation and as a teaching tool. The home boasts displays describing the history of the home, and the house is labeled with numbered plaques that annotate significant architectural elements of the home.

1.2 Objective

All buildings, especially historic ones, require regular planned maintenance and repair. The most notable cause of historic building element failure and/or decay is not due to the fact that the historic building is old, but rather it is caused by an incorrect or inappropriate repair and/or basic neglect of the historic building fabric.

This report satisfies Section 110 of the National Historic Preservation Act (NHPA) of 1966 as amended and will help the Joint Base Langley-Eustis, Fort Eustis CRM in managing this historic building by prioritizing appropriate maintenance and repair that will help to:

- reduce the cost of maintenance in the long run;
- increase the life of the building and its elements;
- use the building and its elements efficiently;
- increase safety and security; and
- comply with federal and Department of Defense historic preservation regulations.

1.3 Methodology

The Matthew Jones House historic building maintenance and repair program is based on three successive steps—Stage I, II, and III—with each step providing a foundation for the next level. Two architectural historians gathered building data through field inspections. The researchers then compiled this data into the three stages described below.

- Stage I is the identification and documentation of the historic building and classification of the building so that it may be compared to others. This stage produces general identification information, including the background material necessary to establish a "frame of reference" for the building. It includes data

on location, identification, size, codes, and related programs. (See Chapter 3.)

- Stage II allows organization of the building into one or more zones or areas of varying importance for historical and architectural reasons. Stage II contains descriptive information plus photographs and drawings to identify the areas. (See Chapter 4.)
- Stage III contains the identification, evaluation, and description of individual architectural features or elements within each zone established in Stage II (referred to as the Element Report). Stage III also identifies deficient elements and provides work recommendations and cost estimates to correct these deficiencies. The elements are organized into several divisions such as exterior, interior, or electrical. It is the data in Stage III which is most applicable to the maintenance, repair, and rehabilitation of the building. (See Chapter 5.)

1.4 Scope

The data collected for work related to this maintenance and repair program for the Matthew Jones House is organized in two parts: graphic documentation and written information.

The graphic portion consists of photographs and floor plans of the building as it existed at the time of the inspection, plus the color-coded zone building plans that have been developed.

The written portion consists of the various elements of the building and potential repair/replacement options guided by the Secretary of the Interior Standards.

The data begins with Chapter 2 which presents the most pressing repair and maintenance issues.

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2 Maintenance Priorities and Recommendations

Due to the urgency of some of the elements in need of attention, a summary of the concerns and recommended actions is presented here (with a note of which report section provides more detail).

2.1 Items in need of immediate attention

- The air conditioning unit for the Matthew Jones House needs to be shut off immediately. The ventilation system of the unit is causing severe damage to the structure and the architectural elements of the Matthew Jones House. It is highly recommended that the CRM staff contract a systems professional, preferably one that has expertise in installing and maintaining units in house museums. The professional should evaluate and calibrate the amount of humidity that is currently in the structure and determine what should ultimately be the ideal environment for the structure. The installation of insulated pipes is also recommended. (See Section 5.10 beginning on page 243 for further information and images.)
- There are several gaps within the brick exterior walls. The cracks that have formed within the walls—especially the crack that stretches vertically on the northwest wall—are large enough that daylight can be seen through them. Cracking may be caused by structural movement or settlement of the building, use of too-hard repointing mortar, or differing rates of expansion and contraction between adjacent materials. (See Section 5.3 beginning on page 78 for further information and images.)
- The Matthew Jones House was not designed with gutters and downspouts. Therefore the water that is shed from the roof falls directly at the base of the building. This flow allows the rainwater to hit the ground, splash onto the brick exterior walls, and causes the water to travel towards the house instead of away from it. The ground and site immediately adjacent to the structure need to be sloped away from the brick facades. This can be accomplished either through grading the soil, installing a French drain system, or combining both techniques.

(See Section 5.2 beginning on page 67 for further instructions and images that show specific problem areas.)

- Since a house of this era did not have a gutter system, the wood hatch doors to the basement will always be susceptible to water damage. The wood hatch doors will be especially susceptible since they take on rainwater from both slopes of the house roof and from the shed roof of the addition located on the rear of the building. (See Section 5.5 beginning on page 128 for further instructions and for images that show specific problem areas.) Since the initial survey for this report, Joint Base Langley-Eustis has replaced the doors; however, Joint Base Langley-Eustis will have to closely monitor the condition of these new doors and will either have to budget money to repair basement doors or install a drainage system to diverge water away from the structure before they begin to deteriorate again. Either way, this action will require State Historic Preservation Office (SHPO) concurrence.
- There are several gaps in the wood roofing shingles that allow water, air, and elements into the interior of the structure. CRM needs to address the various-sized gaps in the roofing material as well as the type of material being used as a roof covering. The gaps in the roof might be a result of the current installation of the individual cedar shingles. The current installation shows the shingles do not overlap each other and therefore create gaps between the shingles that allow air and water to penetrate into the structure. (See Section 5.4 beginning on page 112 for further instructions and images that show specific problem areas.) Replacement of the roofing material may not be an adverse effect depending on the type of replacement material used; however, the roof is such a primary character-defining feature that SHPO concurrence is recommended.
- Problems with the ventilation system have also added to the disintegration of the individual wood shingles. Cupping of the shingles is due to the moisture in the air produced from the air condition unit not being calibrated correctly for the structure, as a result from the poor ventilation system used within the structure. The current shingles were installed in 1993. An expected lifespan of a cedar roof is anywhere between 15-20 years but some higher quality shake/shingle can last up to 50 years. (See Section 5.4 beginning on page 112 for further instructions and images that show specific problem areas.)

2.2 Other issues of note

- All mold on brick and plaster is the result of inadequate heating, ventilation, and cooling (HVAC) system.
- There is no insulation of the inside of the exterior brick wall, historically or now. If the house is to be kept as an architectural-study museum, the correct HVAC system is required to control the amount of moisture allowed in the building and on the architectural elements.
- The house is kept so cold compared to the hot, humid southern summers. The moist, cold air from within the house touches the exposed interior side of the brick while the exterior side of the brick is hot, creating moisture and condensation within the bricks. The bricks are ultimately crumbling to pieces. Evidence of this is seen on the interior with the buildup of “brick dust” at the base of each wall. (See Section 5.7 beginning on page 165 for further information.)
- The location of the narrow slit floor vents within the first-floor floorboards might need to be investigated. The vents are located adjacent to the exposed interior brick walls, allowing the cold moist air to be in direct contact with the bricks. If a new HVAC system is installed, the placement of these floor vents would need to be moved so that the cold air will not be in direct contact with the brick walls. (Please see Sections 5.9.9–5.9.10 beginning on page 224 for further information.)
- There is an issue concerning the ventilation of the Matthew Jones House related to the two-story open space versus the closed-off drywalled space. This issue needs to be investigated; one suggestion would be to have two separate HVAC systems—one per specialized space—to control the appropriate amount of humidity. Drywall has mold retention capabilities, therefore, some of it might have to be removed and replaced.
- Since the Matthew Jones House is not a space used daily by visitors, should the building be air conditioned? If air conditioning is used in the second-floor office space, those walls should be sufficiently insulated. Would an air compressor for the office side of the architectural-study museum be sufficient?

- Mold on the ceiling above the second-floor chamber over the hall suggests a ventilation concern within the attic space of the house. Proper investigation needs to be done to determine the exact cause of the mold, and repair and preventative measures need to be taken to eliminate the mold and future mold. Please see Section 5.10.4 beginning on page 247 for further information.
- Mold and lichen need to be removed from bricks, bricks and mortar cleaned, and mortar repointed. Care should be taken in the repair of the brick walls with materials as near to the original color as possible and with similar mechanical properties as the original brick and mortar. (See Section 5.3 beginning on page 78 for further instructions on the care of brick and images of specific problem areas.)
- Since the Matthew Jones House is currently being used as an architectural-study museum, it is recommended that the first-floor windows (Period III) be removed and replaced with more accurate Period II windows. The two-pane double-hung windows on the second-floor should remain in place (Period III). This action requires review by a qualified architectural historian. The windows are a main character-defining feature, so SHPO concurrence is recommended. (See Section 5.5.4 beginning on page 139 for further information.)
- The wood door on the southeast elevation needs to be removed and replaced with a more accurate door for the Period II construction. (See pages 128–138 in Section 5.5 for more information.)
- Remove all equipment from the first-floor porch tower. Clear the floor and do not let anything lean against the brick and plaster walls.
- Remove all equipment and office supplies from the hall. Clear the floor and do not let anything lean against the brick and plaster walls.
- Move all displays, cabinets, and office supplies off of and away from vents located in the floorboards. (Please refer to Sections 5.9.9–5.9.11 beginning on page 224 for more information.)
- It is possible to keep an office in the Matthew Jones House for staff, but the building itself should not be used for storage. The house was not

designed to carry the load of extra office furniture, supplies, filing cabinets, field equipment, etc.

- Plaster is cracked and/or damaged in areas throughout house – any repair or maintenance of the plaster should be executed by a qualified professional. (For more information on plaster repair and images of problem areas, please see Section 5.9.7 beginning on page 216.)
- All the equipment in the cellar needs to be moved from direct contact with the floor. Standing water is visible in the cellar, and equipment and materials that are currently housed in the cellar are becoming wet; if left as is, further damage will result.
- The two wood fireplace mantels are currently either lying on the cellar floor or propped against a damp cellar wall (see Figure 171 and Figure 172, page 203). These two architectural features need to be immediately removed from the basement and stored in a dryer space.

As a historic maintenance and repair manual for the Matthew Jones House, this report should be consulted for further instructions on maintenance issues and treatments, and referred to for images of specific problem areas. In addition to these specific issues, general cleaning and maintenance should be undertaken on a regular basis. Personnel should again refer to this manual for instruction and information regarding general cleaning and maintenance for all elements of the house.

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3 Stage I: General Information

Stage I is the general identification information, including the background material necessary to establish a "frame of reference" for the building. It includes data on location, identification, size, codes, and related programs.

3.1 Background

LOCATION: The Matthew Jones House is located at the intersection of Harrisson Road and Taylor Avenue, on Joint Base Langley-Eustis. A sewage treatment plant once was located to the south; the area is now a managed natural area. The house is located on the northern end of Mulberry Island. The house sits on a knoll overlooking a marshy, tidal flat area at an elevation of approximately 25 feet above mean sea level.³

USGS: Yorktown United States Quadrangle

Universal Transverse Mercator Coordinates: Zone 18

Easting 357696

Northing 4113858

PRESENT OWNER: Department of Defense

Department of the Air Force

Joint Base Langley Fort Eustis, Virginia 23604

ORIGINAL USE: Residence

PRESENT USE: Office/Architectural-Study Museum

DATE OF CONSTRUCTION: ca. 1725 (with later additions ca. 1730 and in 1893)

SIGNIFICANCE:

The Matthew Jones House illustrates the transition from the post-medieval vernacular to the Georgian style as well as a physical manifestation of the shifting world view that occurred throughout Colonial America

³ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 2.

in the early eighteenth century.⁴ It is the oldest structure on Joint Base Langley-Eustis. It was declared a Virginia Historic Landmark in April 1969, and was placed on the National Register of Historic Places that June. The house is currently being used as an architectural-study museum.

BUILDING NUMBER: 1611

NR: Eligible/Listed

HABS/HAER: HABS VA-163, 95-LEHA, 1-

DESCRIPTION:

The Matthew Jones House, located on the northwest bank of the Mulberry Island, is a 30'-9" x 21'-4" one- and one-half-story brick structure with two exterior gable-end chimneys (Figure 1–Figure 3). There is significant evidence that the building originally was frame construction (Period I, ca. 1725) and ca. 1730 was heavily rebuilt in brick (Period II). All that survives from the Period I house are four framing members and two chimneys. In 1893, the structure was given a full second floor, and the chimney stacks were lengthened to accommodate the modification (Period III).⁵

⁴ James Deetz, *In Small Things Forgotten: An Archaeology of Early American Life* (New York: Anchor Books, 1996)

⁵ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 79.

Figure 1. Location map of the Matthew Jones House
(Linebaugh, Graham, and Patrick 1991).

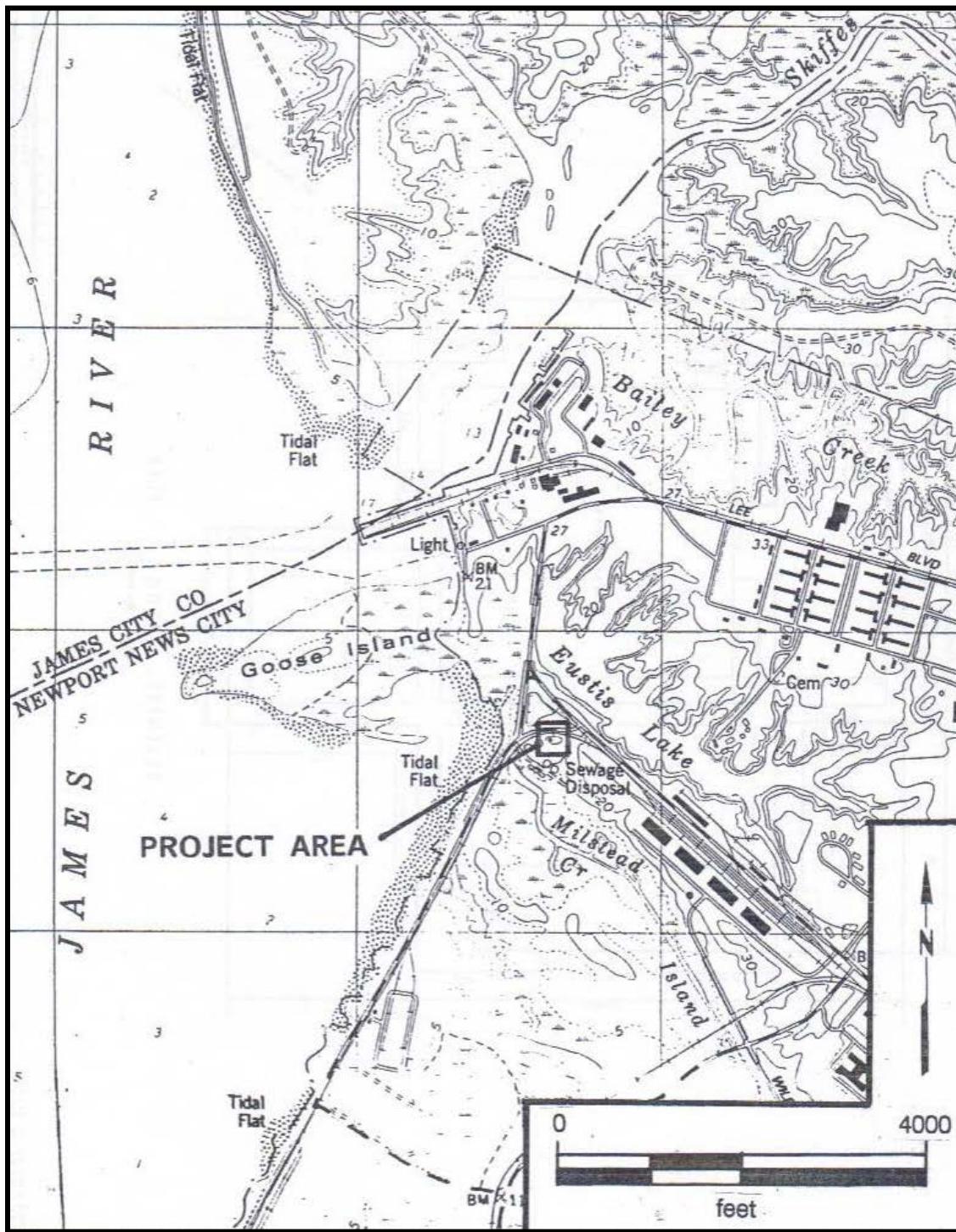


Figure 2. Aerial map with red arrow indicating the location of the Matthew Jones House (bingmaps.com).

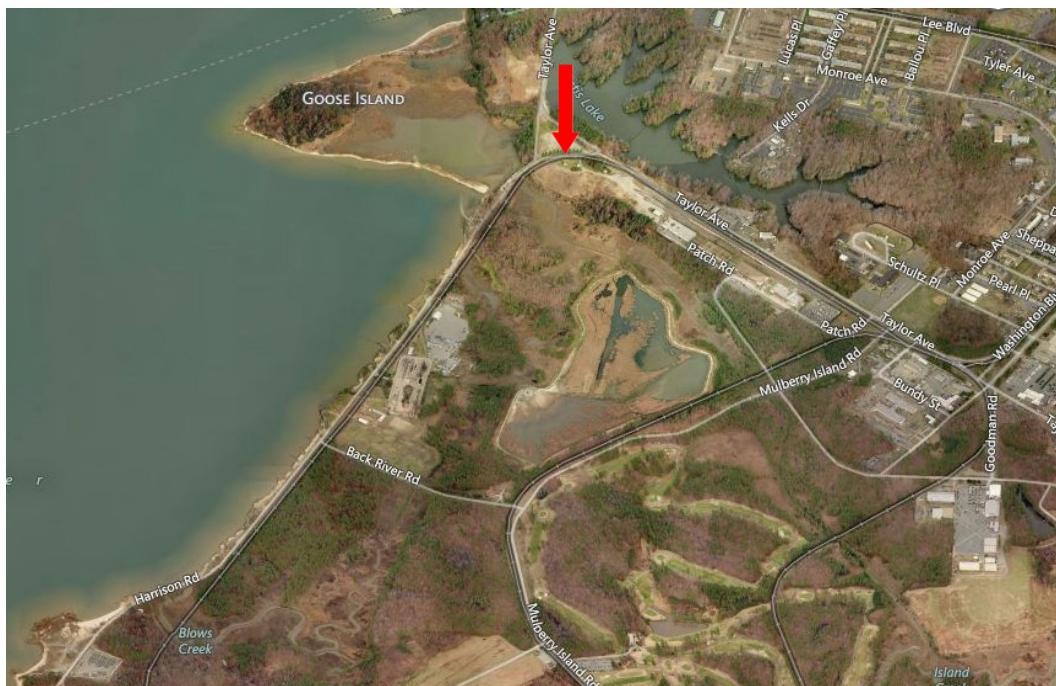
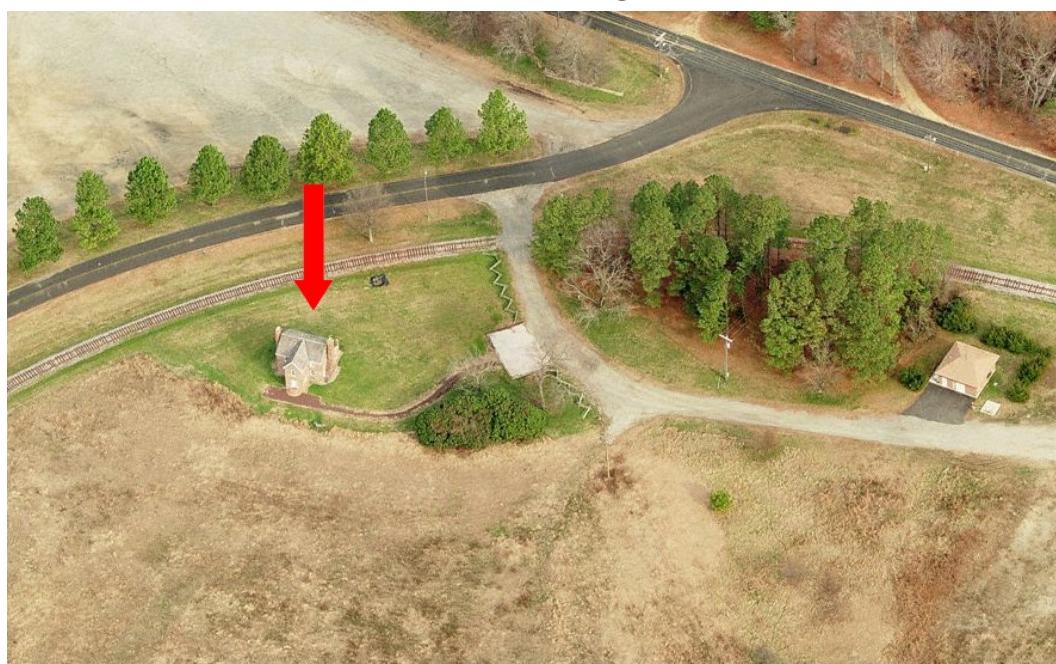


Figure 3. Close-up aerial view with red arrow indicating the location of the Matthew Jones House (bingmaps.com).



Initially, the dwelling consisted of two principal rooms—a “hall and parlor” house.⁶ The larger room served as a hall incorporating cooking, dining, and possible sleeping functions. The other room served as the principal bedroom chamber. There is circumstantial evidence that in this phase (Period I, ca. 1725), the building was of earthfast construction, complete with wood framing members including posts, joists, and plates. As with other early Chesapeake houses, the principal framing members were left exposed, in this case with chamfer and stops cut into the plate and chamber joists and cymas molded into the bottom of the hall joists. Additionally, the evidence suggests that Jones, the builder, intended to upgrade his dwelling soon after construction. Of the intended improvements, he was able to construct a detached kitchen in 1727, a year before his death. Further evidence points to John Jones, a guardian of Scervant Jones (son of Matthew), as the author of the next generation of building alteration.⁷

John Jones began his work in 1729 by felling trees for new framing members to be used in the renovation. He fulfilled the expectations of Matthew by bricking in the exterior walls and reducing the size of the hall fireplace to one of more domestic scale. John’s expectations were greater, though, and he completely transformed the manner in which the house was used. With a new exterior kitchen and a smaller hall fireplace, the slaves and common folk were expelled from the core of the structure. The hall was decorated with a chair rail and served as the primary entertaining room. The old chamber was designated for dining, while a shed built on the rear likely served as a chamber. Because there was no room for a passage within the confines of the original house, a porch tower was erected to provide John with control over his new entertaining spaces.⁸

The various technologies employed in the structure and the changes in its plan present a textbook example of the transformation taking place in Chesapeake society during the eighteenth century. Scholars of vernacular architecture have concluded that earthfast construction was the primary building technology utilized by early Virginians, yet virtually all above-

⁶ Carl R. Lounsbury, *Essays in Early American Architectural History: A View from the Chesapeake* (Charlottesville, VA: University of Virginia Press, 2011).

⁷ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 79.

⁸ *ibid.*

ground evidence for this building type has disappeared. This house is one of the last pre-Revolutionary vestiges of this lost construction.⁹

As a result of changing from a traditional hall/chamber house where the master shared space with his servants to one where segregation of activities and people dominated the layout, the dwelling became an early example of what architectural historians refer to as the three-room house. The addition of a circulation space provided the last major component necessary to complete the plan. Thus ca. 1730, the Jones house architecturally had everything considered necessary for genteel living in the eighteenth century.¹⁰

In 1893, the house was again heavily reworked (Figure 4–Figure 7). The detached kitchen was demolished, and the bricks were used to add a second floor to the house. The chimney stacks were lengthened to accommodate the modification. The bedrooms on the upper floor became a more modern and comfortable size. A stair passage was created to provide access to the full second floor. Virtually all woodwork was replaced inside and out, and plaster was installed throughout.

⁹ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 79.

¹⁰ *ibid.*

Figure 4. Southwest elevation, 1959 (note the wood addition on the right side of the brick structure that has since been demolished) (HABS No. VA-163, 95-LEHA, 1-).



Figure 5. East oblique of Matthew Jones House, 1995 (Fort Eustis CRM).



Figure 6. Southwest elevation depicting Periods I, II, and III construction.



Figure 7. Southeast elevation depicting Periods I, II, and II construction.



3.2 Exterior description

The Matthew Jones House has a T-shaped plan with a cross-gable roof, a central two-story enclosed porch, and a one-story lean-to attached to the rear. The brickwork of the original portion of the house is laid in Flemish bond with glazed headers above the water table, and with English bond below the water table. The bricks used for the second-story addition are not glazed. The roof is clad in wood shingles. There are two massive exterior chimneys located on the northwest and southeast elevations. The windows are two-over-two double-hung wood sash windows. The rakeboard is of wood construction.

3.2.1 Southwest elevation

The southwest (primary) elevation of the Matthew Jones House has a protruding, two-story, brick, enclosed porch with a rounded wood door and a window (Figure 8). The door is framed with an arched brick lintel. The door has a wide wood threshold. A set of brick steps in a semicircular pattern provides access to the door. The porch enclosure has a gable roof and a brick belt course. The northwest and southeast elevations of the porch each have a single window located on the first floor. Two windows (one per floor) positioned on the main exterior wall flank either side of the porch appendage. This part of the house is often referred to as the “tower.”

Figure 8. Southwest elevation, no date (<http://www.facebook.com/pages/Fort-Eustis-Cultural-Resources-Management/5149>).



3.2.2 Northwest elevation

The northwest elevation has two two-over-two windows and one one-over-one window. This elevation also has one of the two large brick chimneys. To the left of the chimney on the gable wall is a blocked window opening; the opening has been filled with a different type of brick used elsewhere on the house (Figure 9).

Figure 9. Northwest elevation of Matthew Jones House showing original chimney, ca. 1730 brick walls, porch tower (right), and rear shed (left) (ERDC-CERL, 2012).



3.2.3 Northeast elevation

The northeast elevation has four two-over-two windows. Three are located on the second floor and one on the first floor. The shed room (rear chamber) addition is located on the left side of this elevation, and wood cellar doors provide access to the basement level. A square brick chimney stack projects above the shed roof line (Figure 10).

Figure 10. Northeast elevation of Matthew Jones House (ERDC-CERL, 2012).



3.2.4 Southeast elevation

The southeast elevation has two two-over-two windows and one one-over-one window. This elevation has one of the two large chimneys. A replacement wood entry door is located to the left of the chimney. This door was cut into the southeast wall as an afterthought during the ca. 1730 renovation, Period II (Figure 11).¹¹

Figure 11. The southeast elevation of Matthew Jones House (ERDC-CERL, 2012).



3.3 Interior description

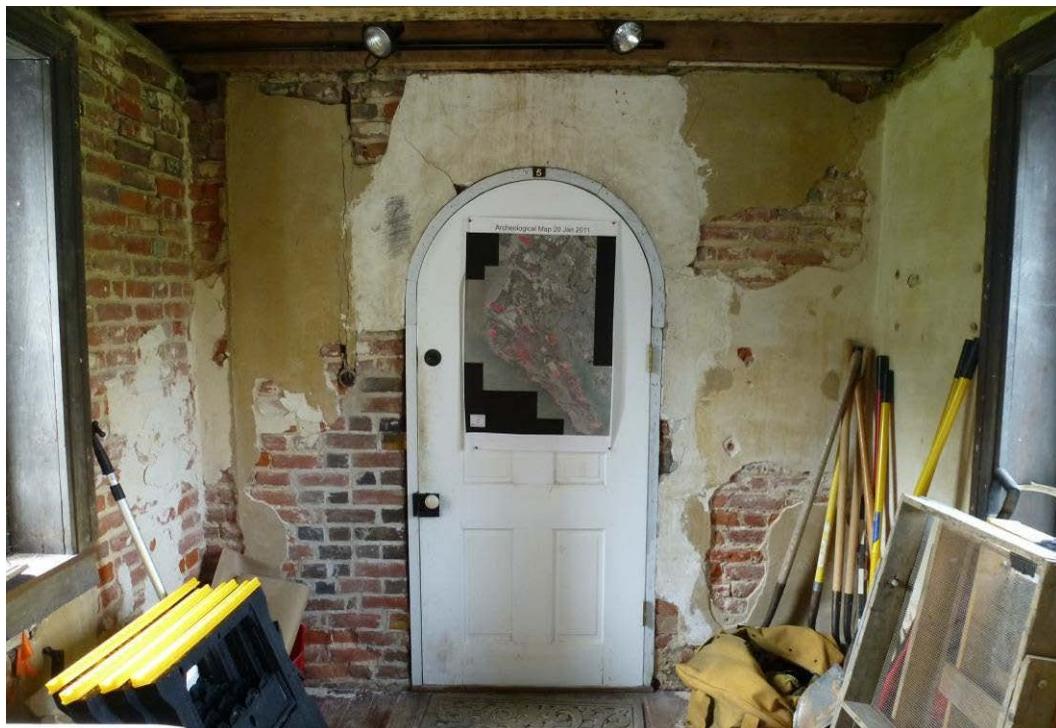
The interior of the Matthew Jones house morphed from Period I to Period III when it was substantially remodeled to include a second floor, all new door and window trim, and a completely finished interior.

3.3.1 First floor

The first-floor tower entrance porch interior measures approximately 10'-0 1/2" x 9'-1". It has a wood floor, brick walls, and an exposed ceiling. Most of the plaster covering the brick walls is failing and is detaching from the wall. Evidence of plaster failure is seen by the amount of plaster dust accumulating on the wood floor. An arched wood (replicated) door with original wood jamb leads from the porch to the stair passage (Figure 12).

¹¹ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 56.

Figure 12. First-floor interior of porch tower, with arched door leading to the stair passage (ERDC-CERL, 2012).



A small stair passage to the second floor is located beyond the tower entrance. From the tower entrance, one could enter the living room, enter the dining room, or go directly upstairs.

The first-floor hall is located on the northwest side of the house. It measures approximately 11'-9" x 18'-11". It has three windows and two interior doors. The focal point of the room is the brick fireplace. The walls are a mixture of exposed brick and plaster, with the exception of the partition wall that separates this room from the stair passage. This room is currently a two-story open space. The floorboards of the second-floor chamber located above the hall and all wood support members have been removed or cut back to display the house as an architectural-study museum. The original wood mantel above the fireplace has been removed and is currently being stored in the basement (see Section 5.9.1, page 202). The hall is the main interior room used for showcasing the construction techniques of the house.

The first-floor dining room/chamber is located on the southeast side of the house and measures approximately 11' 8" x 18'-11". It has two windows and one door leading to the exterior. This doorway was installed as an after-

thought during the ca. 1730 renovations. The door jamb dates to 1893. The focal point of the room is the fireplace located in the center of the south-east wall. The walls are a mixture of exposed brick and plaster, with the exception of the partition wall that separates this room from the stair passage. The ceiling joists have been covered with drywall. This room is currently used as a viewing room for the house's collections. Newer lighting and wall vents have been added to provide comfort for visitors.

The inside dimensions of the shed room (rear chamber) measure 7'-8" x 19'-5". The room contains a small window to the west and an interior corner fireplace and window at the opposite end.¹²

The enclosed stair passage separates the hall from the dining room/chamber. The partition walls were constructed in 1893. Wood stairs with a wood handrail provide access to the second floor. Wood beadboard covers both sides of the partition walls of the stair passage. Under the stair passage is a small closet that houses mechanical equipment. A wood panel door provides access to this space. (This passage is shown in Figure 174 on page 206.)

3.3.2 Second floor

The southeast upper chamber measures approximately 9'11 ½" x 19' 0" in total, but this room has been altered with the addition of partition walls to enclose a bathroom and closet (Figure 13). The room has been updated to accommodate office space for the architectural-study museum. Drywall has been added to the walls and ceiling. New HVAC vents and light fixtures have been added to the space. The Period III fireplace is visible on the southeast wall, and the wood floorboards are intact.

The northwest upper chamber room floorboards have been removed; however the fireplace on the northwest wall is visible as well as the wood mantel that dates to 1893 (Figure 14). The wood door providing access from the second-floor passage is intact (Figure 15); a temporary wood guardrail has been installed for safety measures.

¹² Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 51.

Figure 13. New partition walls added to the second-floor chamber above the dining room on the southeast side of the Matthew Jones House, creating a bathroom space (right) and closet (left) (ERDC-CERL, 2012).

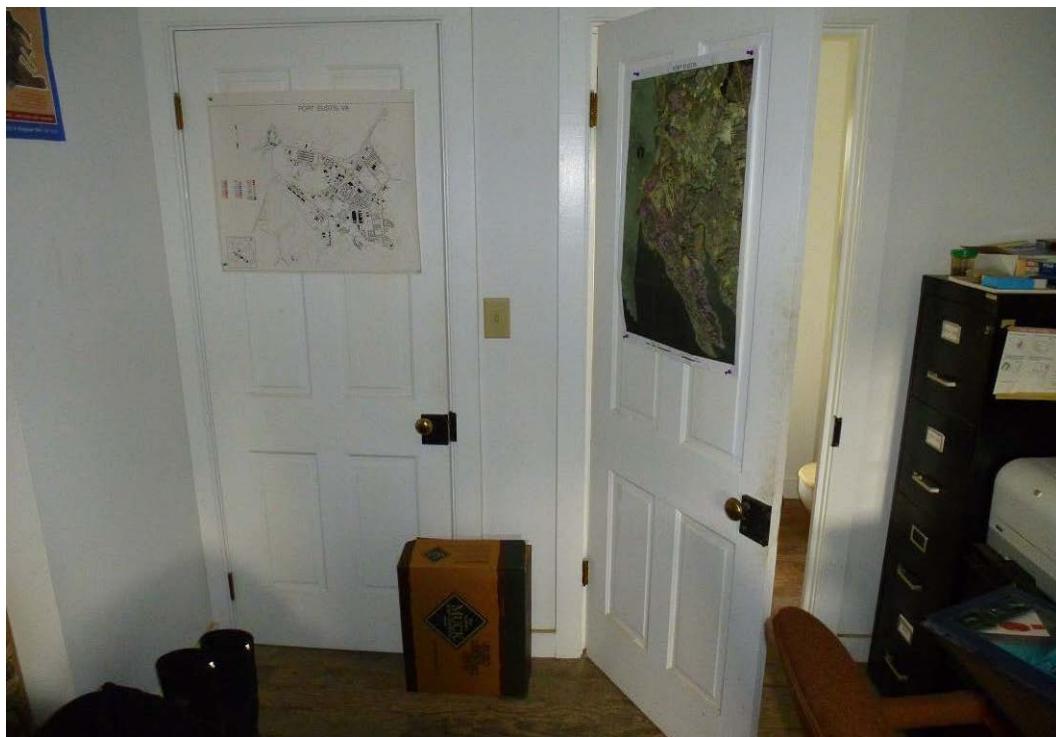
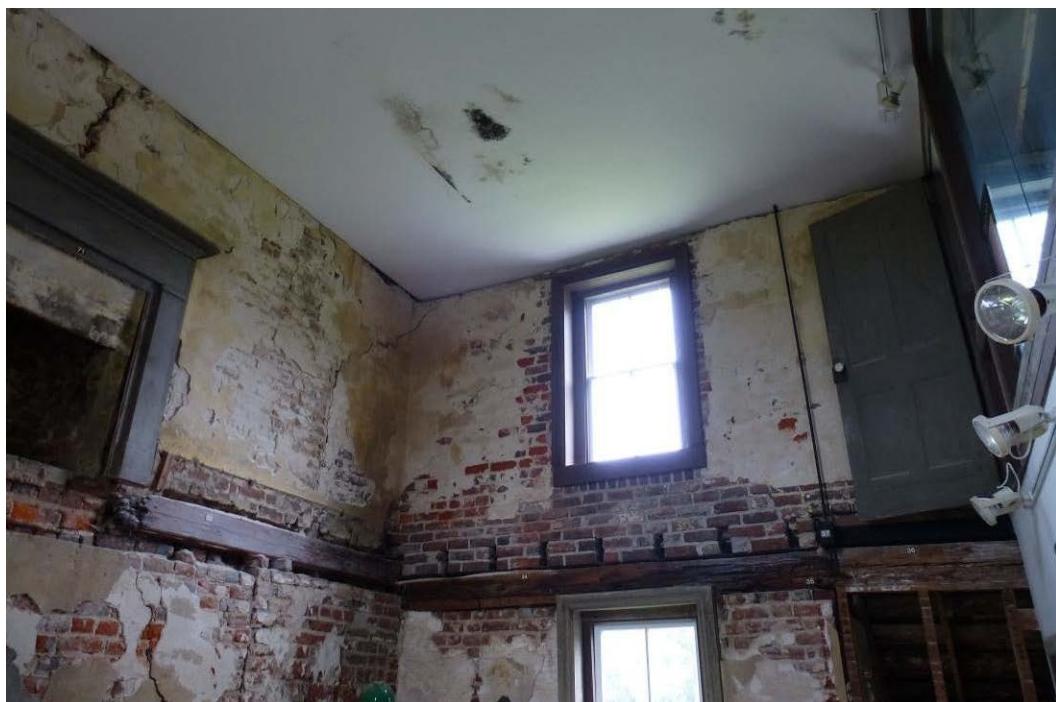


Figure 14. Looking up at exposed second-floor chamber on the northwest side of the Matthew Jones House (ERDC-CERL, 2012).



The second-floor passage has wood floorboards, wood baseboard, exposed roof supports, and a wood balustrade. The southeast wall of the passage has Plexiglas covering a wall of Army graffiti, the oldest of which dates to 1920. The northwest wall is a glass partition that was added during the preservation efforts in 1993 for interpretive purposes of the viewing of the two-story hall space (Figure 16).

Figure 15. Wood door leading from second-floor passage to the second-floor chamber above the first-floor hall of the Matthew Jones House (ERDC-CERL, 2012).



Figure 16. View of the second-floor passage between upper floor chambers of the Matthew Jones House (ERDC-CERL, 2012).



The second floor of the porch tower is currently being used as a storage area (Figure 17). The space measures approximately 9'-9 1/2" x 11'-2". It has wood floorboards, wood baseboards, and a brick wall that is covered with plaster which is severely deteriorated. The ceiling is left exposed in this room. There is a window on the southwest wall.

Figure 17. Second floor of the tower in the Matthew Jones House (ERDC-CERL, 2012).



3.3.3 Cellar

The accessible part of the cellar is divided into two spaces. The first space entered measures approximately 6'-6" x 18'-5". The second space is large and measures approximately 18'-11" x 18'5". A brick wall divides the two spaces. Some of the original first-floor joists are visible in this space. The cellar has three vents through the wall above grade. These three vents should remain open at all seasons of the year. Maximum air flow directed through this space is advantageous to the wood members in the building. At some point, a poured concrete floor was added over the original dirt floor.

4 Stage II: Building Zones

Stage II allows the organization of the building into one or more zones, or areas of varying importance for historical and architectural reasons. Stage II also contains descriptive information plus photographs and drawings to identify the areas.

Building zones establish the framework for planning for the operation, maintenance, and rehabilitation of an individual building by dividing the building into logical areas consistent with their use, original design, public access, and integrity. The concept of zoning, while establishing a logical framework, is also consistent with techniques of original architectural programming, design, and construction.

The zoning of the building identifies the differences between more- and less-significant interior and exterior building areas, and it assigns a numerical rating, or level, to each zone. The zone ratings establish management and treatment requirements for each zone. For example, highly significant public spaces may be in a “preservation zone” where maintenance is tightly controlled and replacements are restricted. At the other end of the spectrum, larger, more private work areas may be subject to normal maintenance and be open to a much broader range of architectural modification. The treatment guidelines for each level convey the general principles of preservation to be applied within the zone.

4.1 Summary of zones

Each of the building's six zones is listed below (with graphic color indicator in parentheses):

- Level 1 – Preservation Zone (red)
- Level 2 – Preservation Zone (yellow)
- Level 3 – Rehabilitation Zone (green)
- Level 4 - Free Zone (white)
- Level 5 – Hazardous Zone (black outline)

- Level 6 – Impact Zone (red stripes)

The Matthew Jones House has five of the six zones.

4.2 Level 1 – Preservation Zone (red)

Level 1 areas, both in plan and elevation, are those that exhibit unique or distinctive qualities, original materials or elements original to one of the significant periods of the building, or representative examples of skilled craftsmanship, work of a known architect or builder, or are associated with a person or event of preeminent importance. Level 1 areas can be distinguished from Level 2 areas by concentrations of detailing or “richness” of finish material and detail. Level 1 areas are colored in red on the elevations and floor plan drawings (Figure 37–Figure 43).

EXAMPLE: Spaces or areas of a building representing the highest degree of detailing and finish level, such as the main lobby or public spaces in an office building or public building, the foyer and parlors of a historic residence, the offices of the most “important” tenants within a building or space, assembly spaces such as a courtroom or a library reading room, parlor, etc., or the primary building elevation(s); in other words, that elevation which is the most visible to the public.

GUIDELINE: The character and qualities of this zone should be maintained and preserved as the highest priority.

The area of significance is architecture. The Matthew Jones House is an excellent example of the transition in architectural styles from the post-medieval vernacular to the Georgian style to the Victorian style, and remains the last fully earthfast structure known in Virginia.

Level 1 (Preservation Zone) elements of the Matthew Jones House (shown in Figure 18–Figure 29 and Figure 37–Figure 43) are:

- Overall, the brickwork on all of the façades, and
- the two-story porch tower, and
- the two side chimneys, and
- the wood two-over-two windows on the second floor-Period III (6 total), and

- the wood, arched entry door on the southwest elevation, and
- wood rakeboard and soffit, and
- the chimney on the shed room (rear chamber) addition, including the brick chimney stack, and
- the interior of the first-floor porch tower, including the brick and plaster walls, the exposed ceiling joist, and the wood floor, and
- the arched door from the porch tower interior to the stair passage, including the laminated arched door jamb, and
- the hall including the brick and plaster walls, the wood floor, and the brick chimney on the northwest wall, and
- the second-floor chamber over the hall, including the brick and plaster walls and the brick chimney, and
- the shed room (rear chamber) addition, including the brick walls, wood floor, exposed ceiling and roof supports, and chimney, and
- the fireplace on the southeast wall in the dining room, and
- various wood structural members.

Areas that need the most attention are the brickwork on all elevations, including the two original chimneys and the second-floor wood windows (Figure 18–Figure 21). These areas are of significant historic value, and the CRM and Civil Engineering Division (CED) staffs should maintain and perform necessary repairs to ensure that the materials do not deteriorate further. Mold and lichen growth needs to be removed from the brick and mortar, the brick and mortar cleaned, and the mortar repointed in identified areas to prevent further deterioration. Care should be taken in the repair of the brick walls with materials as near to the original color as possible and with similar mechanical properties as the original brick and mortar, especially the glazed headers, the rubbed brick quoins, lintels, and jambs, and the grapevine mortar technique used.

There are cracks in most of the masonry walls. Most of them are minor and are a common wall crack probably caused by thermal or moisture expansion. However, two are of concern. One is a large crack that runs vertically along the northwest wall. The other crack is located above the se-

cond-floor chamber over the hall. Both of these cracks have formed gaps in the exterior wall where one can see daylight through them, ultimately allowing the elements from outside into the building. Most are attributed to the expansion of the wood framing on the interior, but the freeze-thaw cycle also contributes to the growth of cracks. These cracks need to be addressed immediately.

The spalling, dusting, or flaking of brick masonry units may be due to either mechanical or chemical damage. Mechanical damage is caused by moisture entering the brick and freezing, resulting in spalling of the bricks' outer layers. Spalling may continue or may stop of its own accord after the outer layers that trapped the interior moisture have broken off.¹³

Chemical damage is due to the leaching of chemicals from the ground into the brick, resulting in internal deterioration. External signs of such deterioration are a dusting or flaking of the brick. Very little can be done to correct existing mechanical and chemical damage, except to replace the brick. Mechanical deterioration can be slowed or stopped by directing water away from the masonry surface and by pointing mortar joints to slow water entry into the wall. Surface sealants (damp-proofing coatings) are rarely effective and may hasten deterioration by trapping moisture or soluble salts that inevitably penetrate the wall and in turn can cause further spalling. Chemical deterioration can be slowed or stopped by adding a damp-proof course (or injecting a damp-proofing material) into the brick wall just above the ground line. Consult a masonry specialist for this type of repair.¹⁴

The northwest and southeast chimneys are original features to the house. Much about the changes to the house over the past 289 years can be read from each chimney's interior surface. These two features need to be preserved and maintained on a regular basis. The interior of the brick chimneys are in poor condition. The inside of the bricks are showing severe signs of deterioration. Similar to the interior brick walls, the chimneys are crumbling and "brick dust" is collecting in piles at the base of the chimneys (refer to Figure 88 and Figure 149). Since the Matthew Jones House is being used as an architectural-study museum, replacement of these bricks is not recommended, but it is a concern to the CRM staff on how to

¹³ Excerpt from The Old House Web. "General Masonry Inspection." Online resource (n.d.) available at: <http://www.oldhouseweb.com/how-to-advice/general-masonry-inspection.shtml>.

¹⁴ ibid.

maintain these already-deteriorated bricks and to prevent complete loss of these features. Some procedures that could be used to stop the deterioration of the brick (e.g., sealants) are not recommended by the Secretary of Interior Standards for Rehabilitation¹⁵.

The CRM staff needs to immediately hire a professional brick mason knowledgeable in local brick structures. The mason should perform a thorough investigation of all brick in the Matthew Jones House to determine which bricks are too far gone and to determine the type of deterioration that is attacking the bricks (e.g., mechanical deterioration or chemical deterioration).

Figure 18. South oblique with two-story porch tower (ERDC-CERL, 2012).



¹⁵ National Park Service. The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings. (Washington, DC: US Department of the Interior, National Park Service, Technical Preservation Services, 2001.) Online version available at: <http://www.nps.gov/tps/standards/rehabilitation.htm>.

Figure 19. Southeast elevation with original chimney (ERDC-CERL, 2012).



Figure 20. Northeast elevation (ERDC-CERL, 2012).



Figure 21. Northwest elevation with original chimney (ERDC-CERL, 2012).



Figure 22. Preserve the wood two-over-two windows, including the rubbed brick lintel and jamb on the second floor (ERDC-CERL, 2012).



Figure 23. Preserve the arched wood front door, including the rubbed-brick arched lintel and jamb, as well as the brick steps in front of the door on the southwest elevation (ERDC-CERL, 2012).



Figure 24. Wood rakeboard and soffit (ERDC-CERL, 2012).



Figure 25. The first-floor porch tower including the wood arched door and wood jamb (ERDC-CERL, 2012).

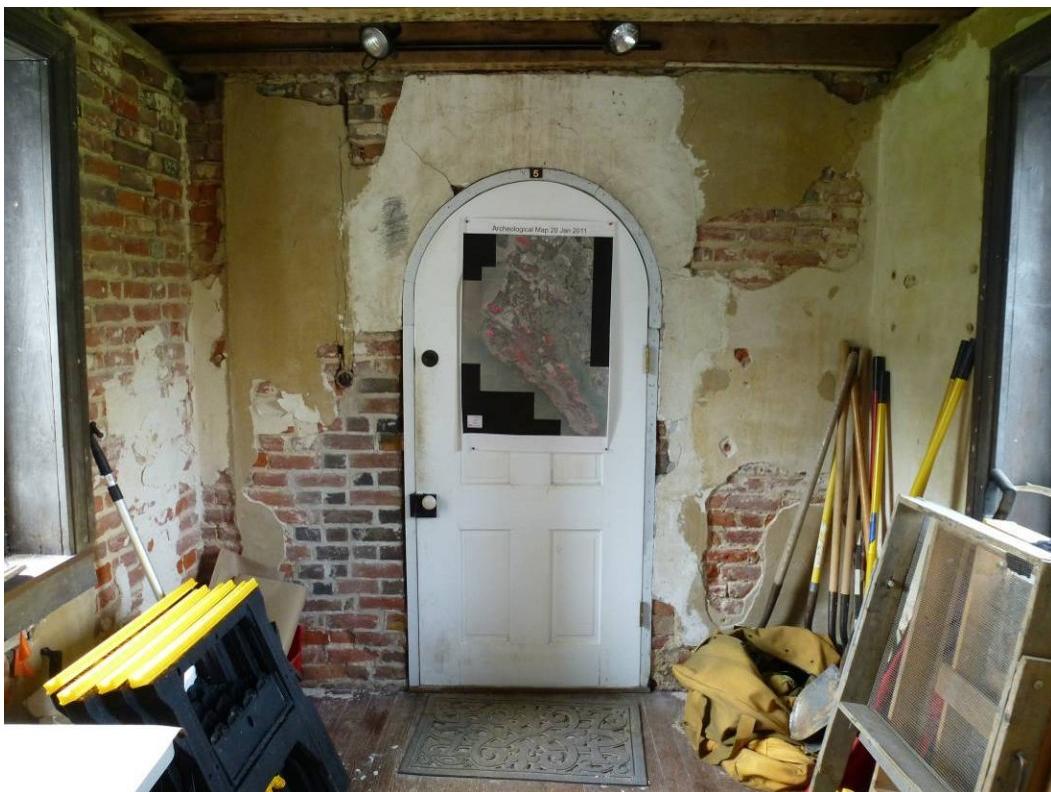


Figure 26. The hall and the second-floor chamber above, including the brick and plaster walls, the wood structural members, and the fireplace (ERDC-CERL, 2012).



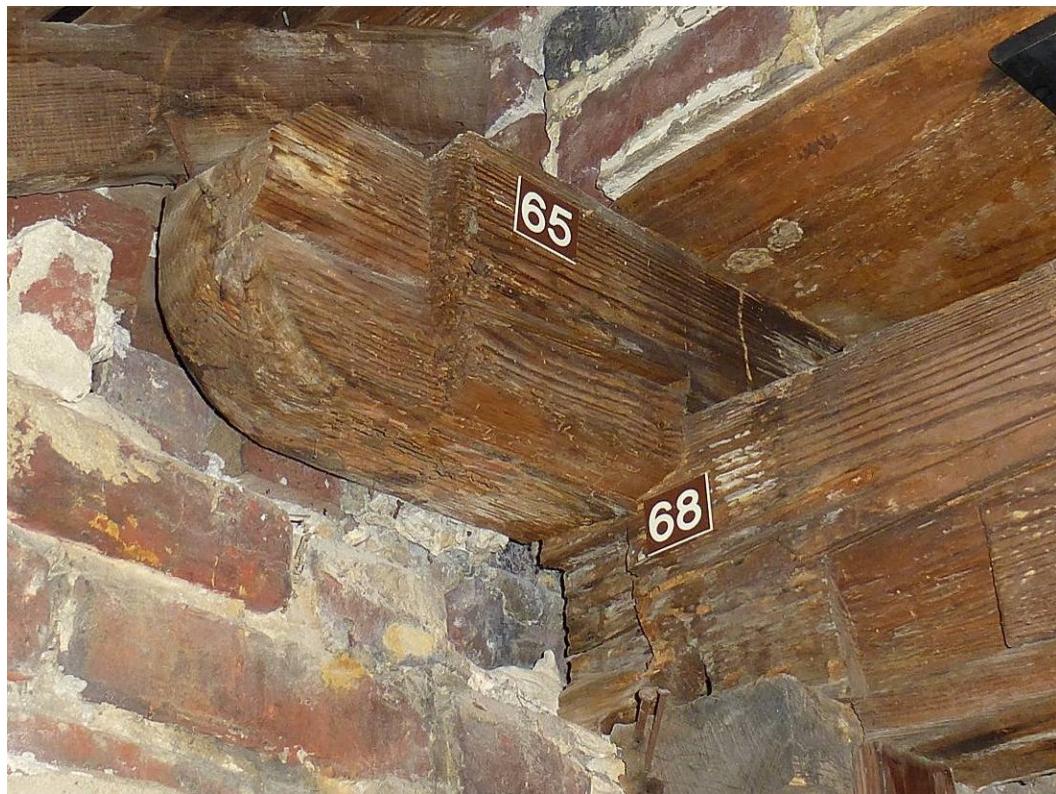
Figure 27. Brick chimney in the hall (ERDC-CERL, 2012).



Figure 28. Brick chimney in dining room (<http://www.facebook.com/pages/Fort-Eustis-Cultural-Resources-Management/5149>).



Figure 29. Original end joists (#65) along with other wood structural members in the Matthew Jones House should be maintained and preserved (ERDC-CERL, 2012).



4.3 Level 2 – Preservation Zone (yellow)

Level 2 areas are those exhibiting distinguishing qualities or original materials and/or features, or representing examples of skilled craftsmanship. Level 2 areas are colored in yellow on the elevations and floor plan drawings (Figure 37–Figure 43).

EXAMPLE: Areas generally with a lower density of original materials and detailing than the primary spaces rated Level 1. Level 2 areas may include circulation spaces, secondary offices, smaller meeting rooms, and side elevations or elevations that are less subject to public view.

GUIDELINE: Every effort should be made to maintain and preserve the character and qualities of this zone.

The area of significance is architecture. The Matthew Jones House is an excellent example of the transition from the post-medieval vernacular to the Georgian style to the Victorian style, and remains the last fully earthfast structure known in Virginia.

Level 2 (Preservation Zone) elements on the Matthew Jones House (Figure 30—Figure 31 and Figure 37—Figure 43) are:

- the wood-shingled roof on the gable of the main block, the gable of the porch tower, and the shed room (rear chamber) roof, and
- the two-over-two wood double-hung windows on the first floor of the house (7 total), and
- The stair passage including the upper stair passage, the wood stairs, handrail, and the wood balustrade, and
- the brick steps in front of the main door, and
- the wood cellar doors.

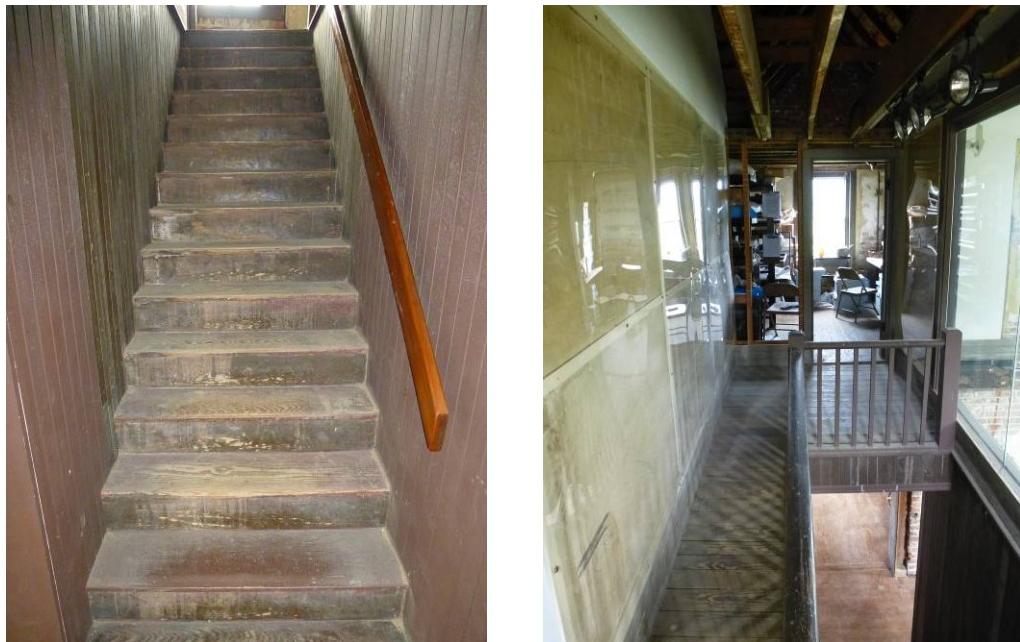
The current wood shingle roof is not original to the Matthew Jones House. It is a replacement roofing system, probably installed during the 1993 preservation efforts. It is however, in-kind to that of the original material and design intent. The condition of the roof is poor (Figure 30).

The failing wood shingles need to be addressed immediately. The system components of the roof are no longer working properly creating gaps in the roof allowing water and exterior elements to penetrate into the structure. The current installation of the shingles is shown that the shingles do not overlap each other therefore creating gaps between the shingles. Replacement of the roofing material may not be an adverse effect depending on the type of replacement material used; however, the roof is such a main character-defining feature that SHPO concurrence is recommended.

Figure 30. Wood shingle roof on main block gable, porch tower gable, and shed room (rear chamber) roof (ERDC-CERL, 2012).



Figure 31. Wood stair leading to second-story passage (ERDC-CERL, 2012).



4.4 Level 3 – Rehabilitation Zone (green)

Level 3 areas are those which are more modest in nature, with a lower density of highly significant features, material or conditions, but which may be original and exhibit distinctive architectural character and retain substantial integrity. Level 3 areas are colored in green on the elevations and floor plan drawings (Figure 37–Figure 43).

EXAMPLE: Secondary and tertiary spaces generally including minor circulation areas such as kitchens, work rooms, areas generally out of public view, and rear elevations which are less visible or have reduced integrity.

GUIDELINE: Undertake all work in this zone as sensitively as possible. However, contemporary methods, materials, and designs may be selectively incorporated, as long as original character and integrity are respected and maintained.

The area of significance is architecture. The Matthew Jones House is an excellent example of the transition from the post-medieval vernacular to the Georgian style to the Victorian style, and remains the last fully earthfast structure known in Virginia.

Level 3 (Rehabilitation Zone) elements on the Matthew Jones House are:

- the first-floor dining room, and
- the second-floor porch tower's interior.

The interior of the dining room and the interior of the second-floor porch tower are Level 3; however, original brick and wood elements located in these areas such as floors, millwork, and brick need to be preserved.

4.5 Level 4 – Free Zone (white)

Level 4 areas are those not subject to the above three categories and whose modification would not represent loss of character, code violation, or intrusion to an otherwise historically significant structure. Level 4 areas are colored white on the elevations and floor plan drawings (Figure 37–Figure 43).

EXAMPLE: Generally undistinguished repetitive areas such as open offices, non-public living and work areas, hotel rooms, and elevations of newer additions to historic buildings which are not already significant in themselves.

GUIDELINE: Treatments in this zone, while sympathetic to the historic qualities and character of the building, may incorporate extensive changes or total replacement through the introduction of contemporary methods, materials and designs; however, sensitive design practices should always be applied in work within, or adjacent to, historic properties.

The interior of the cellar is Level 4; however, the original earthfast members visible in the cellar should be preserved. The small closet tucked under the stair passage is Level 4, as well as the second-floor chamber over the dining room. The brick fireplace should be preserved in this room (Figure 32 and Figure 37–Figure 43).

Figure 32. Fireplace on the southeast wall in the second-floor chamber room should be preserved (ERDC-CERL, 2012).



4.6 Level 5 – Hazardous Zone (black outline)

Level 5 areas are those exhibiting hazardous materials or conditions. Level 5 areas are outlined in black on the elevations and floor plan drawings (Figure 37–Figure 43).

EXAMPLES: Exposed materials such as asbestos, flammable liquids, or lead paint; hazardous conditions such as high-voltage equipment (transformers), elevator equipment, and exhaust fans; and required exit through a mechanical room.

GUIDELINE: Special treatments in this zone are probably not required.

There were no hazardous zones identified at the Matthew Jones House.

4.7 Level 6 – Impact Zone (red stripes)

Level 6 areas are those that are improperly used and may result in code violations, or areas insensitively adapted that have resulted in a general loss or concealment of character and/or a loss of character that obscures

significant historic fabric or features. Adequate existing fabric must be available to support or provide guidance for the rehabilitation of the zone and the restoration of the character of the original area. Level 6 areas are striped in red on the elevations and floor plan drawings (Figure 37–Figure 43).

EXAMPLES: Corridor walls constructed from non-rated materials creating potential fire hazard. Large stylistically distinctive public spaces such as a lobby or ballroom which has been subdivided into smaller spaces using full height permanent partitions and which results in loss of character, spaces which have been insensitively rehabilitated using modern materials such as pre-finished wall panels over original decorative materials, or important elevations which have been insensitively modified.

GUIDELINE: Deficiencies in this zone should be corrected and loss of character, fabric, and/or features should be mitigated where possible.

The area of significance is architecture. The Matthew Jones House is an excellent example of the transition from the post-medieval vernacular to the Georgian style to the Victorian style, and remains the last fully earthfast structure known in Virginia.

Level 6 (Impact Zone) elements on the Matthew Jones House (Figure 33–Figure 36 and Figure 37–Figure 43) are:

- the two-over-two wood double-hung windows on the first floor of the house (7 total), and
- the side entry door on the southeast elevation.

Since the Matthew Jones House is currently being used as an architectural-study museum, it is recommended that the first-floor windows (Period III; Figure 33) be removed and replaced with more accurate Period II windows (Figure 34). This action requires review by a qualified architectural historian. Replacement of the windows may not be an adverse effect depending on the type of replacement material used; however, the windows are such a main character-defining feature that SHPO concurrence is recommended.

The entry on the southeast elevation was installed as an afterthought during the ca. 1730 renovations (Figure 35). It replaces an original window

opening. The current door is not appropriate to the date of the modification. It should be replaced with a more accurate example (Figure 36).

Figure 33. Wood windows on the first floor of the Matthew Jones House need to be replaced with more appropriate Period II windows (ERDC-CERL, 2012).



Figure 34. Example of wood window to replace the first-floor windows on the Matthew Jones House (photo taken at Colonial Williamsburg, Virginia; ERDC-CERL, 2012).



Figure 35. Current wood door on the southeast elevation (ERDC-CERL, 2012).



Figure 36. Example of an appropriate wood side door for Period II (photo taken at Colonial Williamsburg, Virginia; ERDC-CERL, 2012).



Figure 37. Matthew Jones House, southwest elevation, building zone diagram.



Figure 38. Matthew Jones House, northwest elevation, building zone diagram.

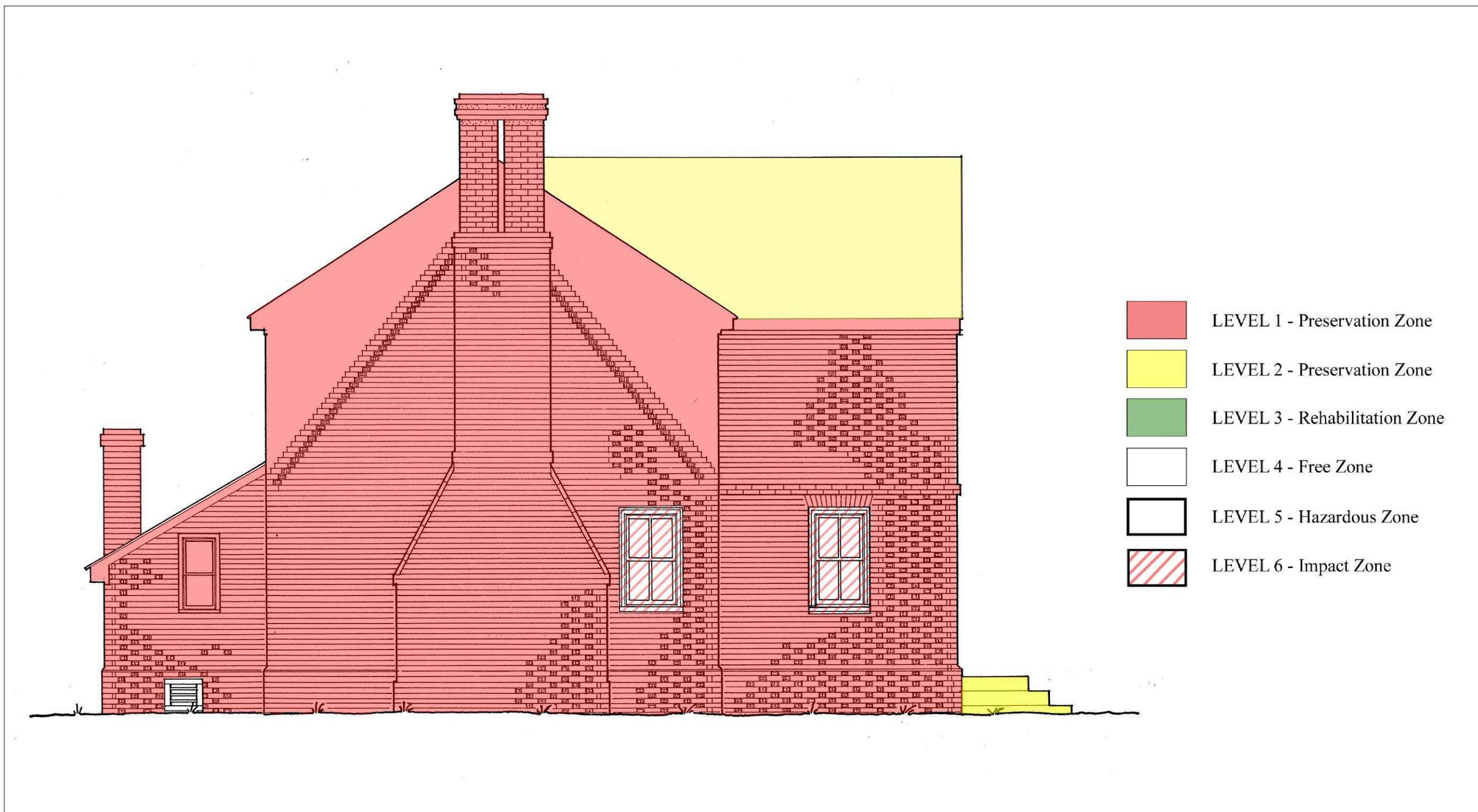


Figure 39. Matthew Jones House, southeast elevation, building zone diagram.



Figure 40. Matthew Jones House, northeast elevation, building zone diagram.



Figure 41. Matthew Jones House, cellar floor plan, building zone diagram

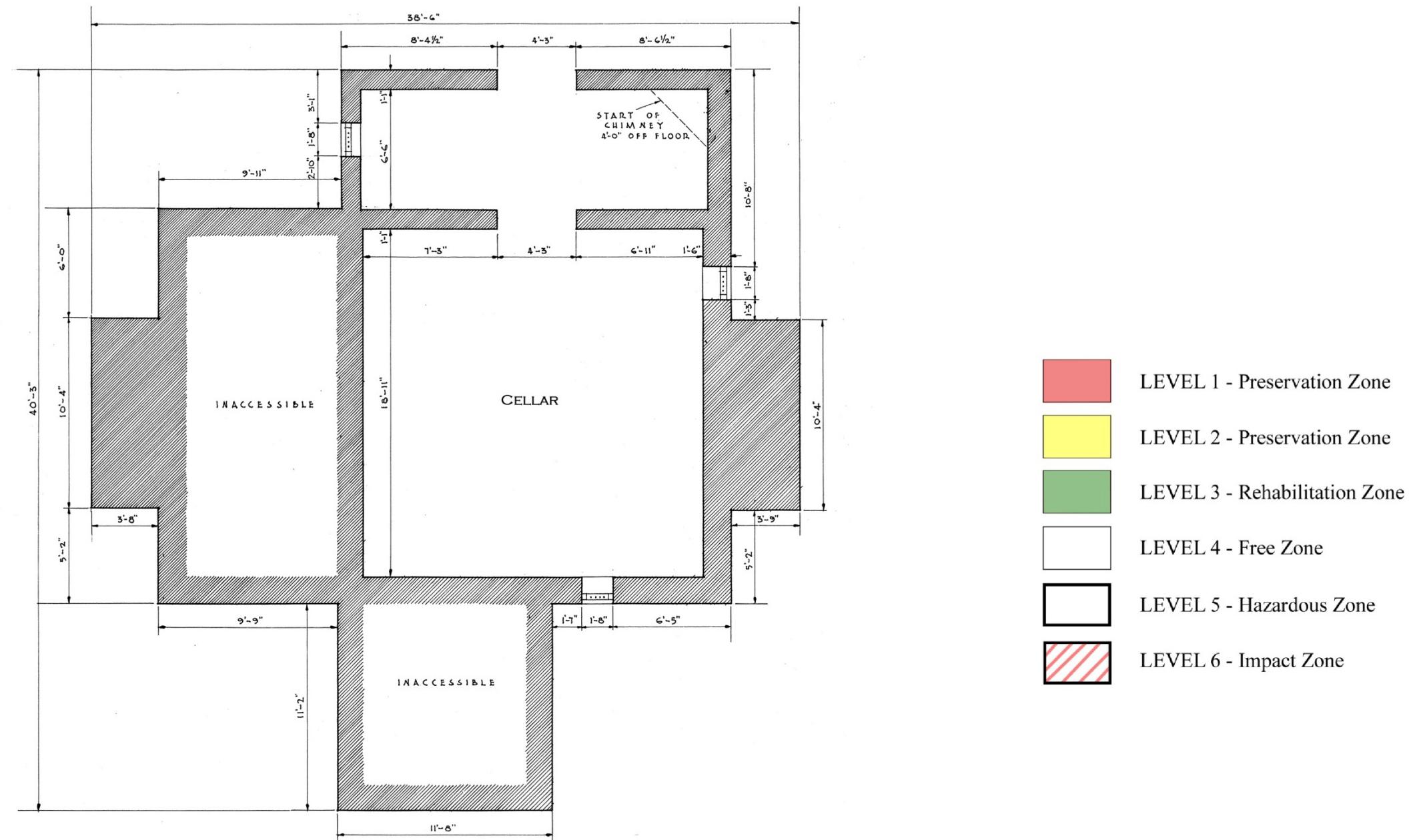


Figure 42. Matthew Jones House, first-floor plan, building zone diagram.

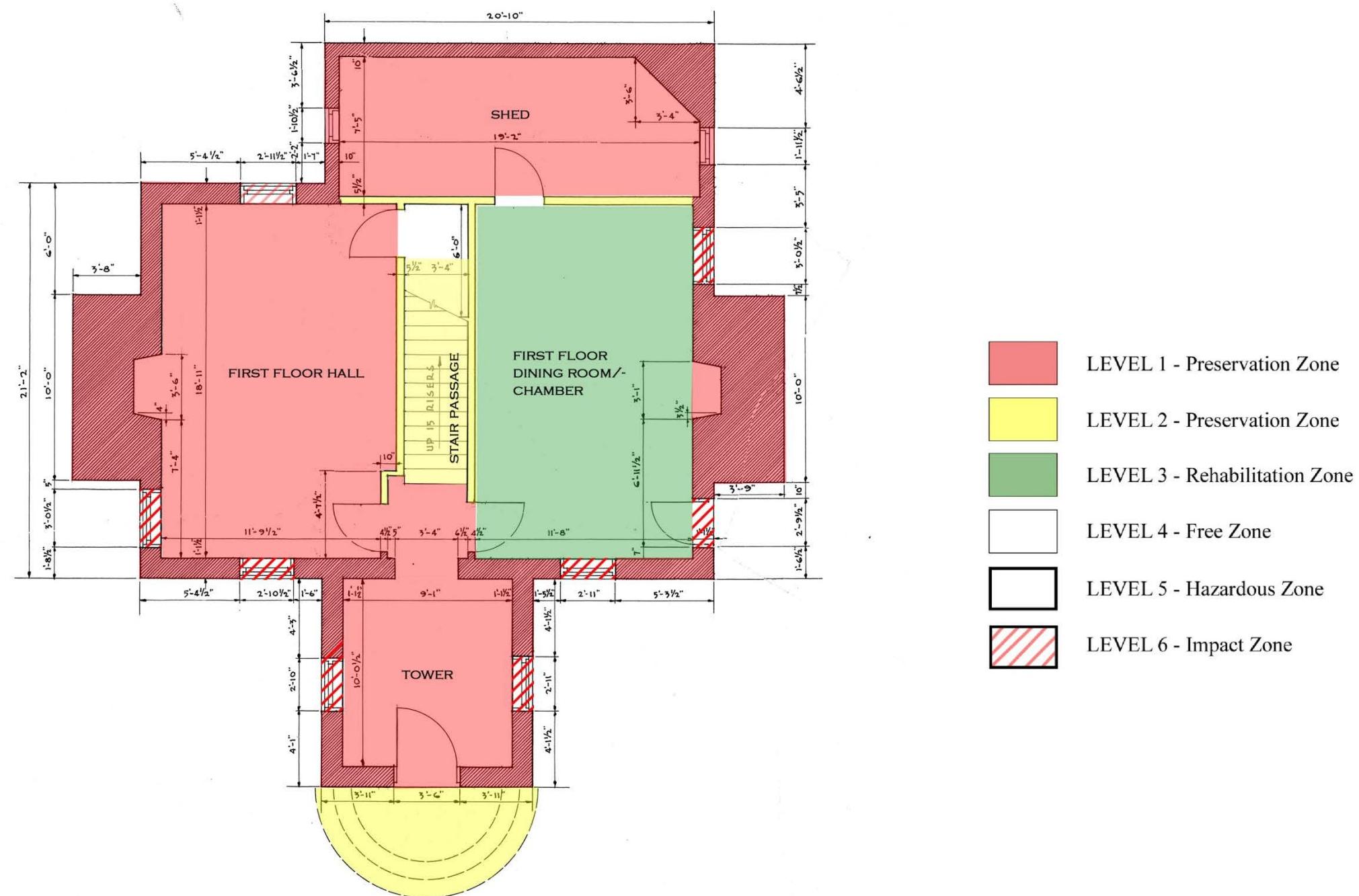
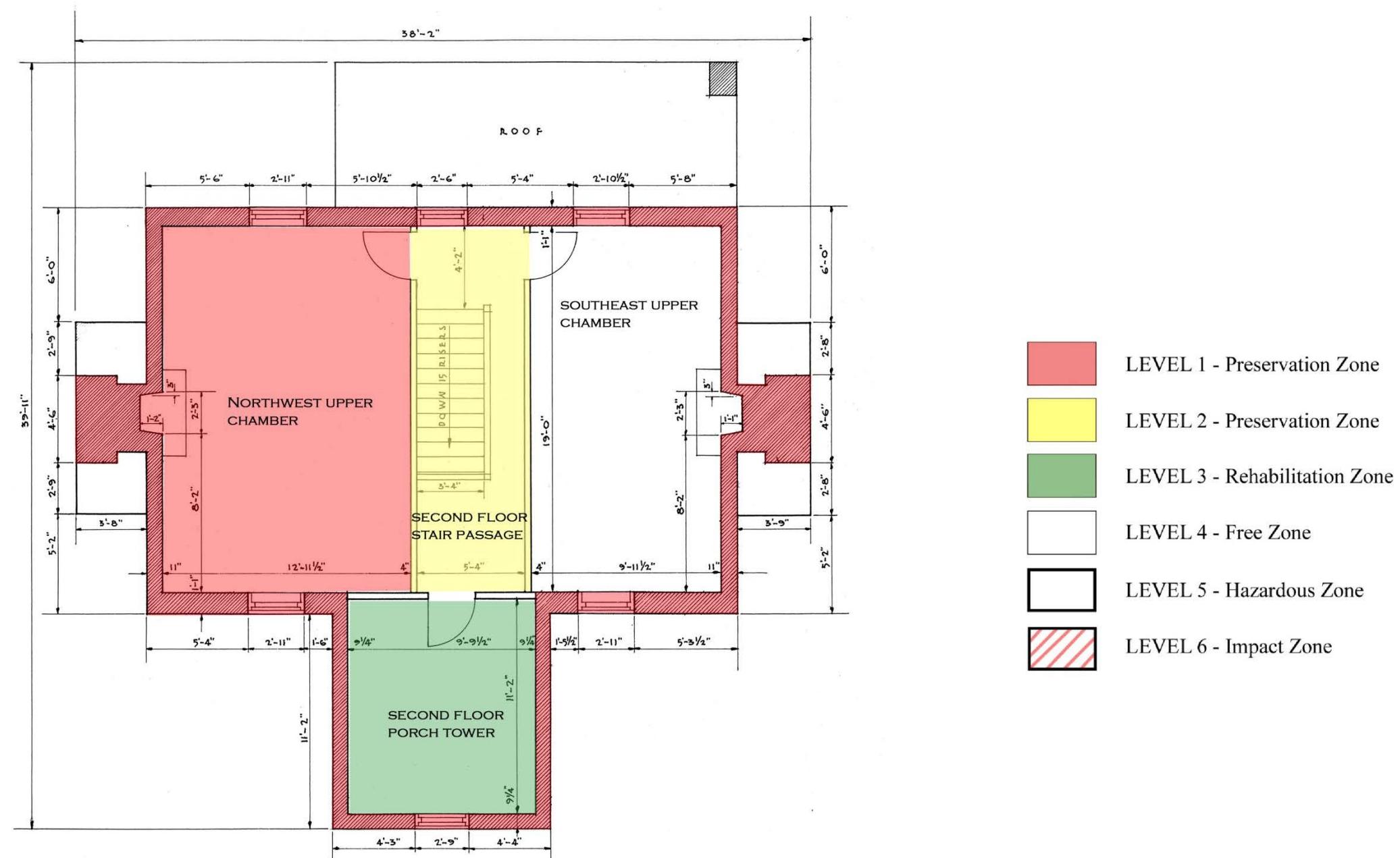


Figure 43. Matthew Jones House, second-floor plan, building zone diagram.



5 Stage III: Element Report

Stage III contains the identification, evaluation, and description of individual architectural features or elements within each zone established in Stage II (referred to as the Element Report). Stage III also identifies deficient elements and provides work recommendations and cost estimates to correct these deficiencies. The elements are organized into several divisions, such as Exterior, Interior, or Electrical. It is the data in Stage III which is most applicable to the maintenance, repair, and rehabilitation of the building.

5.1 General assessment

There are specific trouble areas for the Matthew Jones House which need to be addressed as soon as possible, should be more closely inspected, and/or should be more rigidly maintained.

The overall element conditions for the Matthew Jones House are good, except where identified in this report. The areas and associated general problems of particular concern are detailed below.

5.1.1 Brick masonry walls

The exterior of the Matthew Jones House is red brick and tan mortar. All masonry areas will need maintenance, as several cracks have formed creating gaps within the exterior walls of the house, especially the crack that runs along the northwest wall. The crack that needs to be addressed immediately runs diagonally on the northwest facade. Also the interior brickwork is deteriorating, especially the brick around both fireplaces. These brick features are literally turning to “brick dust.”

5.1.2 Roof

The roof of the Matthew Jones House is in poor condition. The wood shingles have aged beyond maintenance and need to be replaced. Due to improper interior ventilation system and the construction method used to install the current shingles, the wood shingles are cupping; in turn, the cupping is causing gaps in the roof that allow exterior elements to penetrate into the interior of the house.

5.1.3 HVAC system

The HVAC system in the Matthew Jones House is causing serious structural and maintenance issues. The system should be turned off immediately until a professional can assess the system and give professional advice on the running of the system or the replacement of the system.

5.1.4 Site and landscape

The grounds immediately adjacent to the Matthew Jones House need to be sloped away from the structure to allow water to be shed farther from the exterior of the house. Since the house was not originally designed with gutters, the rainwater sheds directly from the roof edges, falls to the ground, and splashes back up on the exterior brick walls.

5.1.5 General information

Preservation is defined as the act or process of applying measures to sustain the existing form, integrity, and material of a building or structure.

This Element Report is the first part of the inventory and condition assessment and provides an inventory of the materials, components, and systems found within the building. The inventory and condition assessment is organized into six categories or divisions on the pages that follow. These categories are: site, exterior, interior, foundation, furnishings, utilities/systems, and fire/life/health safety. Within these categories, an element may be an architectural feature, structural component, engineering system, or functional requirement. For each element found within the building, a number of aspects are reported.

Maintenance personnel should be particularly concerned with the specific treatments associated with each numerical value (i.e., that a #1-rated element must be preserved, or that a #3-rated element should be preserved if at all possible, but if it must be replaced, then modern materials are acceptable when used in a manner sympathetic to the historic character of the building). The classification levels and corresponding treatment standards are intentionally general at the building level. Their purpose is to heighten awareness, guide management, prevent unnecessary (potentially irreversible) damage, and promote sensitive management and maintenance.

5.2 Site

5.2.1 Grounds

The Matthew Jones House faces roughly southwest. The house sits on a knoll overlooking a marshy, tidal flat area at an elevation of approximately 25 feet above mean sea level. Milstead Creek enters the James River a few hundred feet south of the house.¹⁶ The land around the house is covered with maintained and mowed grass, with taller marsh grass beyond on the southwest side. The landscaping exhibits modification probably associated with construction of the sewage treatment plant that dates to the late 1940s. A paved parking area is located on the northeast side of the structure. The house is accessed via a gravel walkway (Figure 45 and Figure 46). Red, crushed rock is laid out in a rectangular pattern in front of the main entry on the southwest side (Figure 44), and multi-color pebble rock forms a border around the entire structure (Figure 48). Railroad tracks run along the north side of the property (Figure 47). A timber fence stretches across the easterly side of the grounds, perpendicular to the railway line (Figure 49).

¹⁶ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 2.

Figure 44. South oblique showing the crushed red rock in front of the main entry on the southwest side (ERDC-CERL, 2012).



Figure 45. View from parking area towards the Matthew Jones House, looking southwest (ERDC-CERL, 2012).



Figure 46. Path from parking area to the house needs to be cleared of vegetation and more defined (ERDC-CERL, 2012).



Figure 47. Northeast elevation showing the railroad tracks that run along the property line (ERDC-CERL, 2012).



Figure 48. The current pebble rock that is located around the perimeter of the house (ERDC-CERL, 2012).



Figure 49. Dismantled wood fence needed to be restructured along the easterly side of the house (ERDC-CERL, 2012). This work was done in 2013 by soldier volunteers (see Figure 50).



5.2.2 Immediate concerns for grounds and site

The Matthew Jones House was not designed with gutters and downspouts. Therefore the water that is shed from the edge of the roof falls directly at the base of the building. This issue allows rainwater to hit the ground and splash onto the brick exterior walls, causing the water to travel towards the house instead of away from it. The ground and site immediately adjacent to the structure need to be sloped away from the brick facades. This can be accomplished either through grading the soil, installing a French drainage system, or combining both techniques.

French drains are primarily used to prevent ground and surface water from penetrating or damaging building foundations. This type of drain is a trench that is covered with gravel or rock and contains a perforated pipe to redirect surface and groundwater away from an area.

The site is evaluated as follows:

- The grounds are maintained and are on a regular mowing schedule, and
- the path from the paved lot to the front entrance of the house should be more defined by using crushed oyster shell to fill the walk path (Figure 51), and
- large gravel around the perimeter of the house and no slope or soil drainage system are promoting the deterioration of the base of the house as a direct result of water splashing off the gravel (Figure 48), and
- all walks are not kept clear of debris and overgrown plantings (Figure 45 and Figure 46), and/or
- the wood fence that stretches along the north side of the building is in need of repair (Figure 50), and
- the wood fence is maintained once it has been rebuilt (Figure 50), and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems due to lack of maintenance and care for the site, and/or
- there is a condition with long-term impact beyond 5 years.

It is suggested that a future project investigate historic landscapes from this period of significance: 1725–1893. Not enough historical photographic documentation was found to determine how the Matthew Jones House appeared during its period of significance.

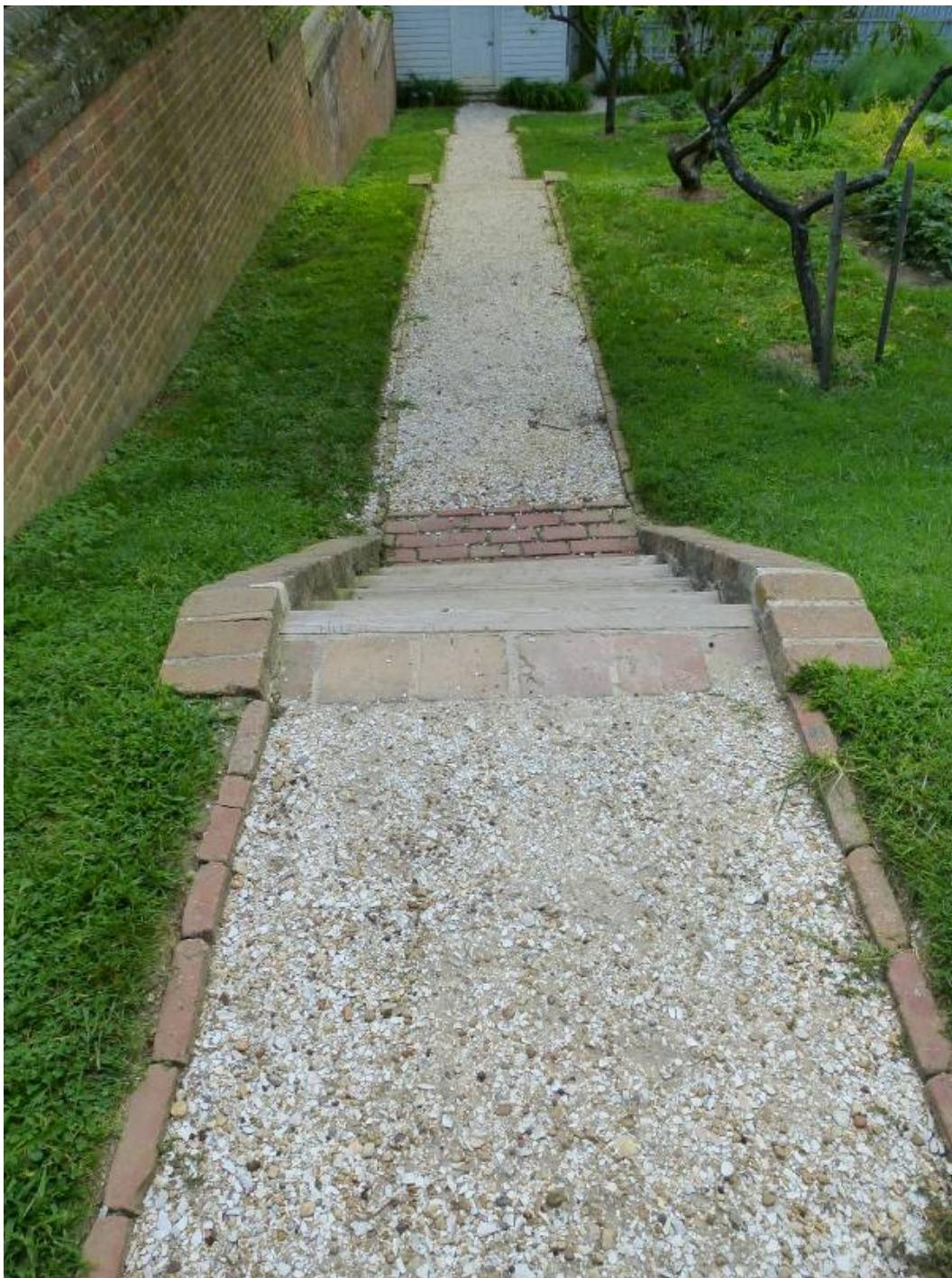
It should be noted that since the time of the initial ERDC-CERL site visit in 2012, the pile of timber (which was once a fence that stretched along the

easterly side of the property) has been reconstructed into a fence again by soldiers who volunteered with the 2013 reconstruction efforts (Figure 50).

Figure 50. Fort Eustis CRM staff and soldiers, who volunteered their time, have rebuilt the fence (Fort Eustis Cultural Resources, 2013).



Figure 51. Example of crushed oyster walkway (photo taken at Colonial Williamsburg, Virginia; ERDC-CERL, 2012).



5.2.3 Maintenance / management guidelines for site

According to *The Secretary of Interior's Standards for Rehabilitation*,¹⁷ the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic site are to be thoroughly read and understood before a treatment is specified. *The Secretary of Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of Interior's Standards for Rehabilitation*. Full documentation can be found at
www.nps.gov/tps/standards/rehabilitation/rehab/building01.htm

Identify, retain, and preserve

Recommended:

- Identifying, retaining, and preserving buildings and their features as well as features of the site that are important in defining its overall historic character.
- Site features may include circulation systems such as walks, paths, roads, or parking; vegetation such as trees, shrubs, fields, or herbaceous plant material; landforms such as terracing, berms or grading; and furnishings such as lights, fences, or benches; decorative elements such as sculpture, statuary or monuments; water features including fountains, streams, pools, or lakes; and subsurface archeological features which are important in defining the history of the site.
- Retaining the historic relationship between buildings and the landscape.

Not recommended:

- Removing or radically changing buildings and their features or site features which are important in defining the overall historic character of the property so that, as a result, the character is diminished.
- Removing or relocating buildings or landscape features thus destroying the historic relationship between buildings and the landscape.
- Removing or relocating historic buildings on a site or in a complex of related historic structures--such as a mill complex or farm--thus diminishing the historic character of the site or complex.
- Moving buildings onto the site, thus creating a false historical appearance.

¹⁷ Grimmer, Anne E., Jo Ellen Hensley, Liz Petrella, and Audrey T. Tepper. *The Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings*. (Washington, DC: US Department of the Interior, National Park Service, Technical Preservation Services, 2011).

- Radically changing the grade on the property, or adjacent to a building. For example, changing the grade adjacent to a building to permit development of a formerly below-grade area that would drastically change the historic relationship of the building to its site.

Protect and maintain

Recommended:

- Protecting and maintaining the building and building site by providing proper drainage to assure that water does not erode foundation walls; drain toward the building; nor damage or erode the landscape.
- Minimizing disturbance of terrain around buildings or elsewhere on the site, thus reducing the possibility of destroying or damaging important landscape features or archeological resources.
- Surveying and documenting areas where the terrain will be altered to determine the potential impact to important landscape features or archeological resources.
- Protecting, e.g., preserving in place important archeological resources.
- Planning and carrying out any necessary investigation using professional archeologists and modern archeological methods when preservation in place is not feasible.
- Preserving important landscape features, including ongoing maintenance of historic plant material.
- Protecting the building and landscape features against arson and vandalism before rehabilitation work begin, i.e., erecting protective fencing and installing alarm systems that are keyed into local protection agencies.
- Providing continued protection of masonry, wood, and architectural metals which comprise the building and site features through appropriate cleaning, rust removal, limited paint removal, and re-application of protective coating systems.
- Evaluating the overall condition of the materials and features of the property to determine whether more than protection and maintenance are required, that is, if repairs to building and site features will be necessary.

Not recommended:

- Failing to maintain adequate site drainage so that buildings and site features are damaged or destroyed; or alternatively, changing the site grading so that water no longer drains properly.
- Introducing heavy machinery into areas where they may disturb or damage important landscape features or archeological resources.
- Failing to survey the building site prior to the beginning of rehabilitation work which results in damage to, or destruction of, important landscape features or archeological resources.
- Leaving known archeological material unprotected so that it is damaged during rehabilitation work.
- Permitting unqualified personnel to perform data recovery on archeological resources so that improper methodology results in the loss of important archeological material.

- Allowing important landscape features to be lost or damaged due to a lack of maintenance.
- Permitting the property to remain unprotected so that the building and landscape features or archeological resources are damaged or destroyed.
- Removing or destroying features from the buildings or site such as wood siding, iron fencing, masonry balustrades, or plant material.
- Failing to provide adequate protection of materials on cyclical basis so that deterioration of building and site feature results.
- Failing to undertake adequate measures to assure the protection of building and site features.

Repair

Recommended:

- Repairing features of the building and site by reinforcing historic materials.

Not Recommended:

- Replacing an entire feature of the building or site such as a fence, walkway, or driveway when repair of materials and limited compatible replacement of deteriorated or missing parts are appropriate.
- Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the building or site feature or that is physically or chemically incompatible.

Replace

Recommended:

- Replacing in-kind an entire feature of the building or site that is too deteriorated to repair if the overall form and detailing are still evident. Physical evidence from the deteriorated feature should be used as a model to guide the new work. This could include an entrance or porch, walkway, or fountain. If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.
- Replacing deteriorated or damaged landscape features in-kind.

Not recommended:

- Removing a feature of the building or site that unrepairable and not replacing it; or replacing it with a new feature that does not convey the same visual appearance.
- Adding conjectural landscape features to the site such as period reproduction lamps, fences, fountains, or vegetation that is historically inappropriate, thus creating a false sense of historic development.

5.3 Brick

The Matthew Jones House originally was a dwelling of frame and earthfast construction, but it was heavily modified to a brick and mortar structure during Period II. The Period II brickwork is beautifully executed and has survived well over the years. All of the brick and mortar contributes to the historic appearance of the Matthew Jones House; it shows the evolution of the structure from Period II to Period III for historical significance.

5.3.1 Brick walls

The brickwork of the original portion of the house is laid in Flemish bond with glazed headers above the water table. This includes a glazed header course just below the rakeboards on all three gables (Figure 52). The bricks used for the second-story Period III addition are not glazed. Mortar used in the walls is lighter in color than the mortar used on the chimneys, has finer particles, and may be slightly smoother in texture. The mortar was struck with grapevine joints (Figure 53). However, the tool to make the joints was wider in the earlier period.

Bright red, rubbed bricks were used on the exterior corners above the water table (including the shed), creating a “quoin” effect (Figure 54). A belt course of gauged and rubbed bricks was used on the tower.¹⁸ When raising the exterior walls to two stories, the new brickwork was laid in seven-course American bond. The ca. 1730 all-glazed header and Flemish bond brickwork are still evident below the strikingly different 1893 work.¹⁹

There are two cases of etched brick located on the building (Figure 64). One is original to the construction of the house and reads “Matthew Jones 1727;” it is located on the right side of the southwest elevation just above the first-floor window. The other etching was added at a later date on one of the bright red, rubbed corner bricks and reads “E.H. Woodruff 1923.”

The house is in good condition on the exterior. The majority of the bricks and mortar are well preserved; however, there are areas of concern in regards to the brick material found on the Matthew Jones House. The primary method of destruction for brick and mortar is moisture, water, and lichen growth. All of these issues of concern are present on all elevations of

¹⁸ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 54.

¹⁹ *ibid.*, 58.

the Matthew Jones House: vertical cracking in the brick wall (Figure 55), efflorescence on the brick (Figure 56), stains on the brickwork (Figure 57), biological growth on the brickwork (Figure 58 and Figure 63), failure of glaze on brick headers (Figure 59 and Figure 60), improper repairs to bricks (Figure 61), and incorrect replacement mortar and poor craftsmanship of replacement mortar (Figure 62 and Figure 65–Figure 67).

Figure 52. The ca. 1730 all-glazed brick header is still evident below the strikingly different 1893 brickwork (ERDC-CERL, 2012).

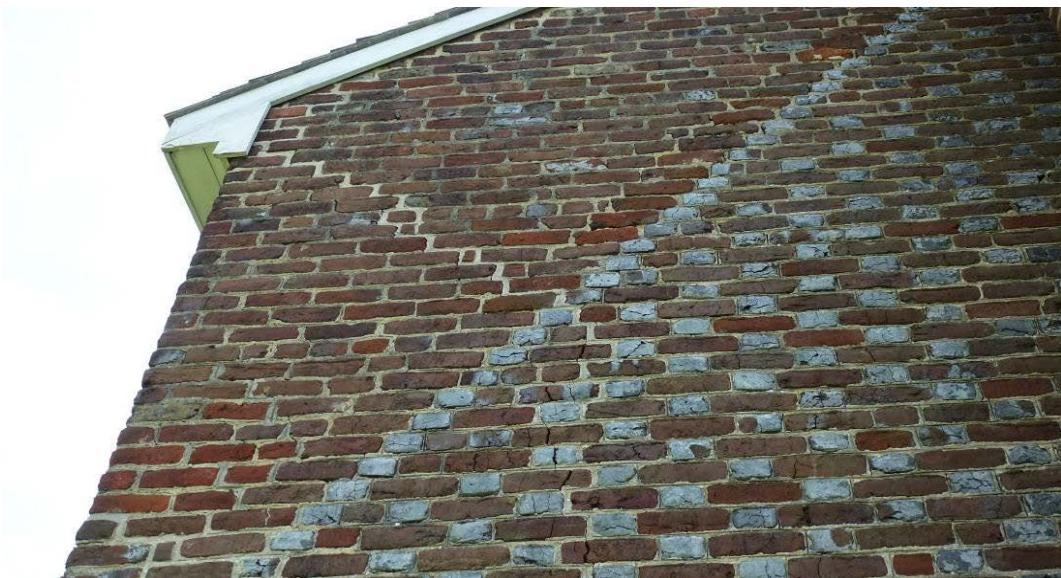


Figure 53. Grapevine mortar joint technique (ERDC-CERL, 2012).

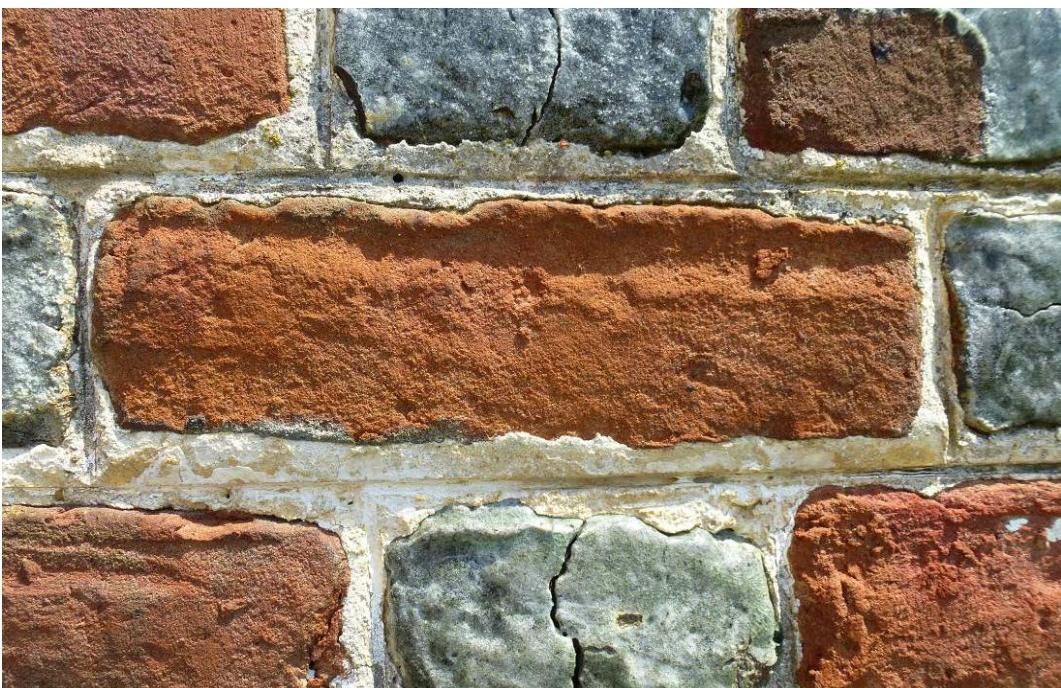


Figure 54. Bright red, rubbed bricks were used on the exterior corners above the water table (including the shed), creating a “quoins” effect. These corner bricks are showing signs of pitting (ERDC-CERL, 2012).

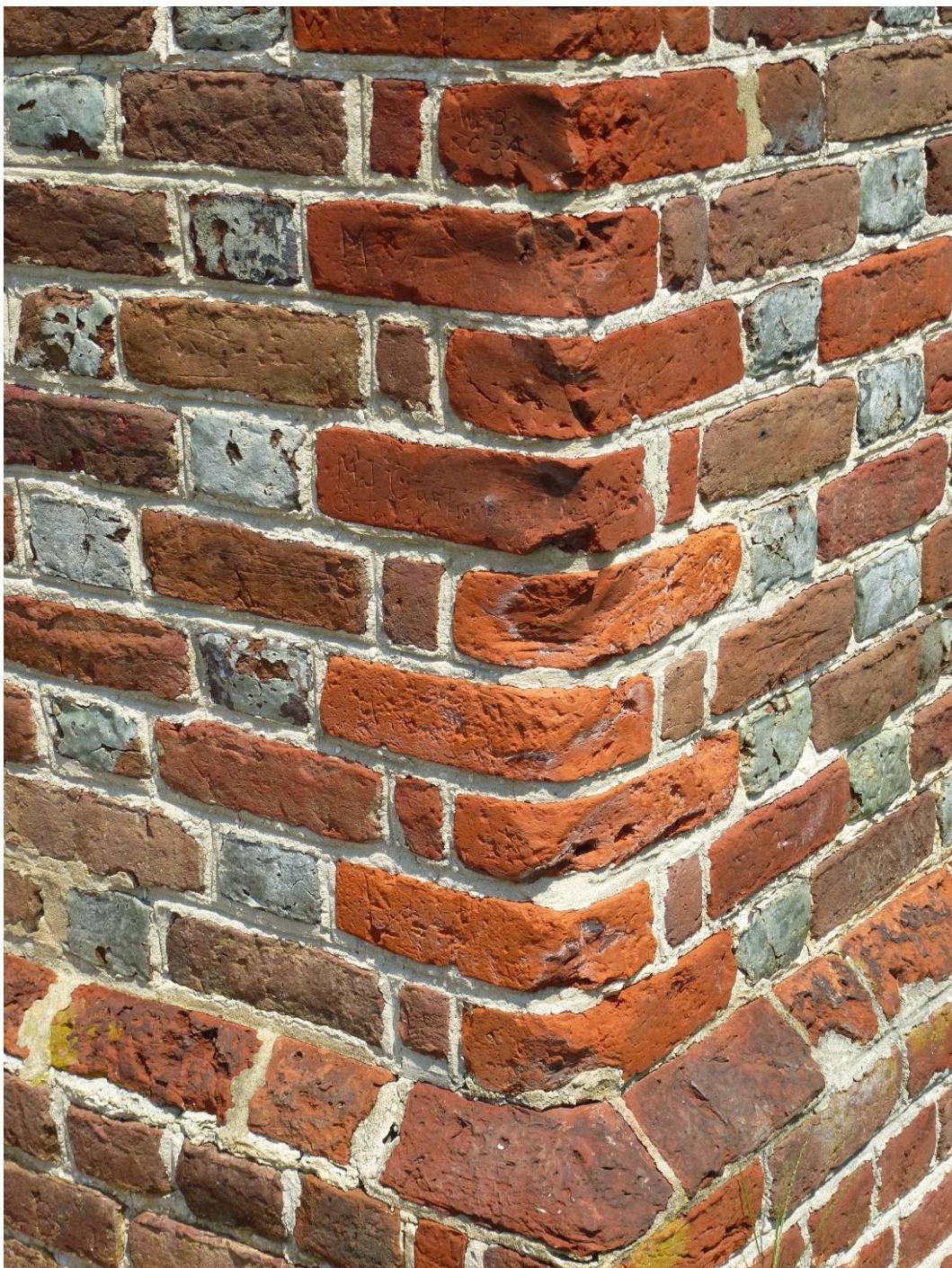


Figure 55. Long vertical crack in the northwest wall (ERDC-CERL, 2012).



Figure 56. Efflorescence on the brick needs to be removed with a mild cleaning technique (ERDC-CERL, 2012).

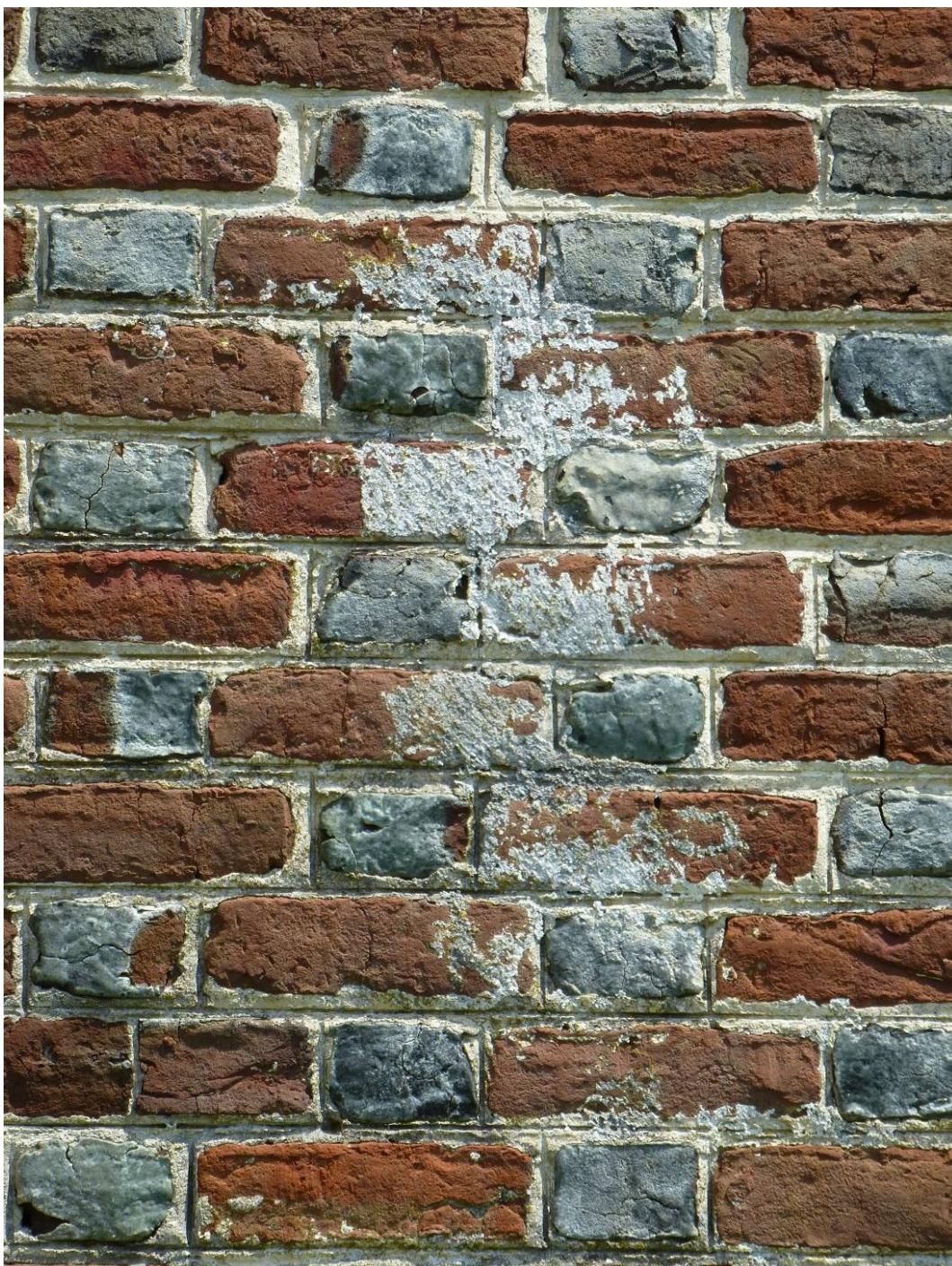


Figure 57. Stains on the brickwork caused by protruding nails should be cleaned according to the *Secretary of Interior Standards for Rehabilitation* (ERDC-CERL, 2012).



Figure 58. Growth and stains on the brickwork caused by water being shed from wood roof member (ERDC-CERL, 2012).



Figure 59. Flaking of the glaze on the brick (center right) is visible on several glazed bricks on the exterior wall (ERDC-CERL, 2012).



Figure 60. Glazing on header bricks is failing due to the evidence of crazing effects within brick (ERDC-CERL, 2012).

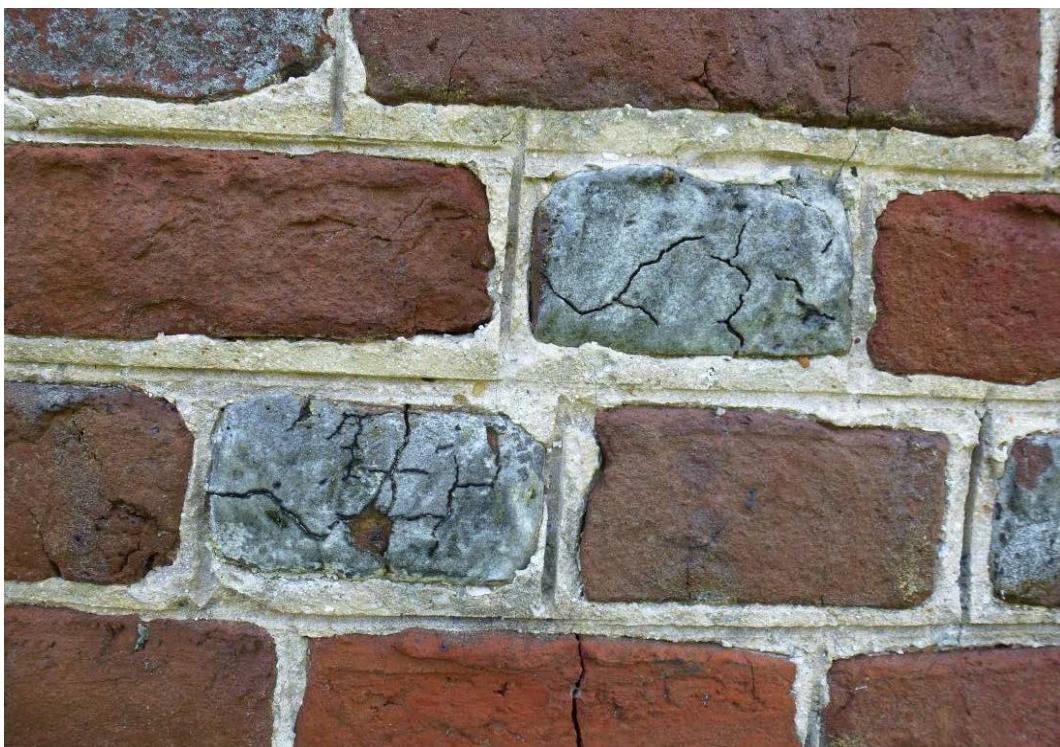


Figure 61. Improper repair of glazed header brick (ERDC-CERL, 2012).



Figure 62. Replacement mortar used on the second floor on the northeast elevation (ERDC-CERL, 2012).



Figure 63. Vegetation growth within brickwork (ERDC-CERL, 2012).

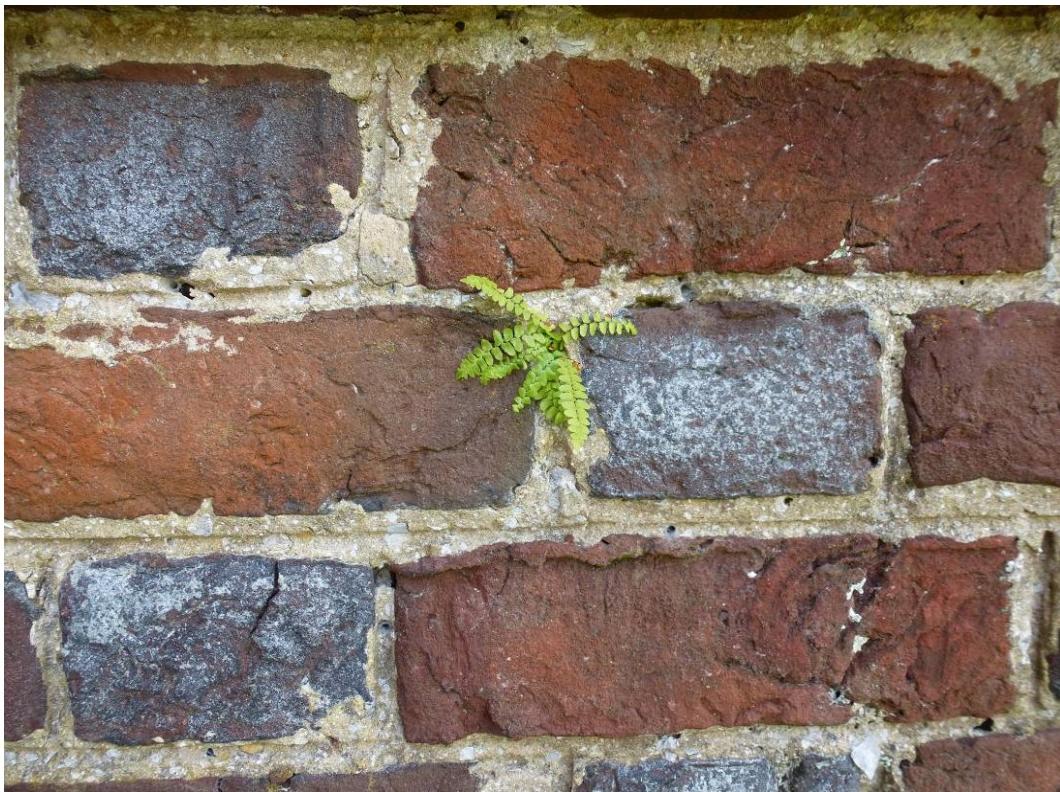


Figure 64. Etched brick (ERDC-CERL, 2012).



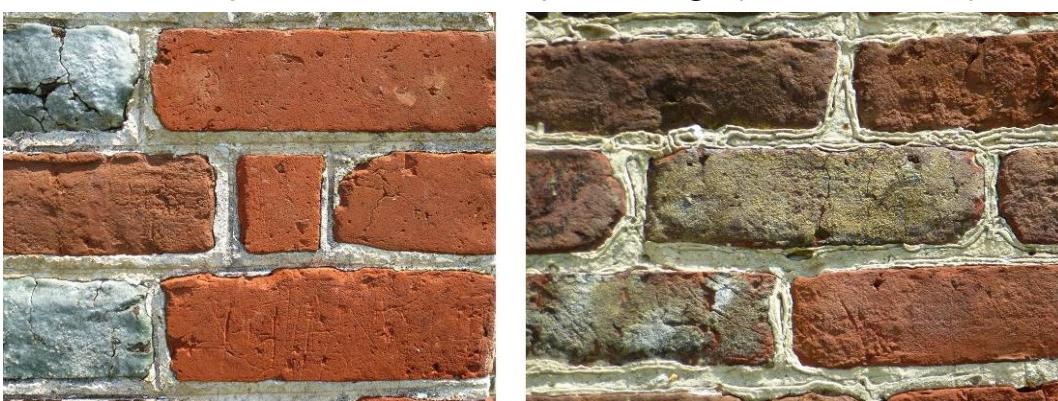
Figure 65. Incorrect mortar and excessive mortar used in previous repairs to the exterior brickwork (ERDC-CERL, 2012).



Figure 66. Examples of poor craftsmanship with replacement mortar (ERDC-CERL, 2012).



Figure 67. Comparison photographs: Correct technique for grapevine mortar joint on the left compared to incorrect technique on the right (ERDC-CERL, 2012).



5.3.2 Brick chimneys

Remaining from the original dwelling are the two chimneys. Both chimneys project 3'-8" from the gables and are 10'-1" wide (Figure 68–Figure 70). The chimneys are laid in Flemish bond (including their stacks); above and below is a shallow water table which utilizes all-glazed headers. The steep shoulders are tiled with bricks set with their wide face exposed, running vertically (Figure 72). Although closers are used, the corner bricks are not gauged or rubbed. The top three courses of the original cap survive under the late nineteenth-century stack extensions (Figure 71).²⁰ The chimneys were lengthened by adding twin stacks to the top of each chimney (Figure 71).

The early chimney bricks measure 8-8^{1/2} x 2^{1/2}-2^{5/8} x 3^{7/8}-4^{1/8}". The chimney bricks tend to the brown and purple-brown range, with an occasional use of salmon. Few salmon bricks were used in the second phase; the later bricks tended to be rosier in color. Mortar used on the chimneys is a buff color with large chunks of shell and lime. The mortar was struck with grapevine joints.

A third chimney stack was added when the shed room (rear chamber) addition was constructed ca. 1730 (Figure 69). This chimney is located on the northeast corner of the addition. It is much smaller in design. It is integrated into the adjacent brick exterior walls, and a square-shaped stack projects above the shed roof.

Similar to the brick facades, the chimney bricks exhibit issues of concern that require maintenance (Figure 73–Figure 75).

²⁰ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 40.

Figure 68. Northwest chimney (ERDC-CERL, 2012).



Figure 69. View of all three chimneys, two original chimneys on the side of the main block and one on the shed room (rear chamber) addition (ERDC-CERL, 2012).



Figure 70. Side view of the northwest chimney (ERDC-CERL, 2012).



Figure 71. The top three courses of the original cap survive under the late nineteenth-century stack extensions (ERDC-CERL, 2012).



Figure 72. Connection between the chimney and main block (ERDC-CERL, 2012).

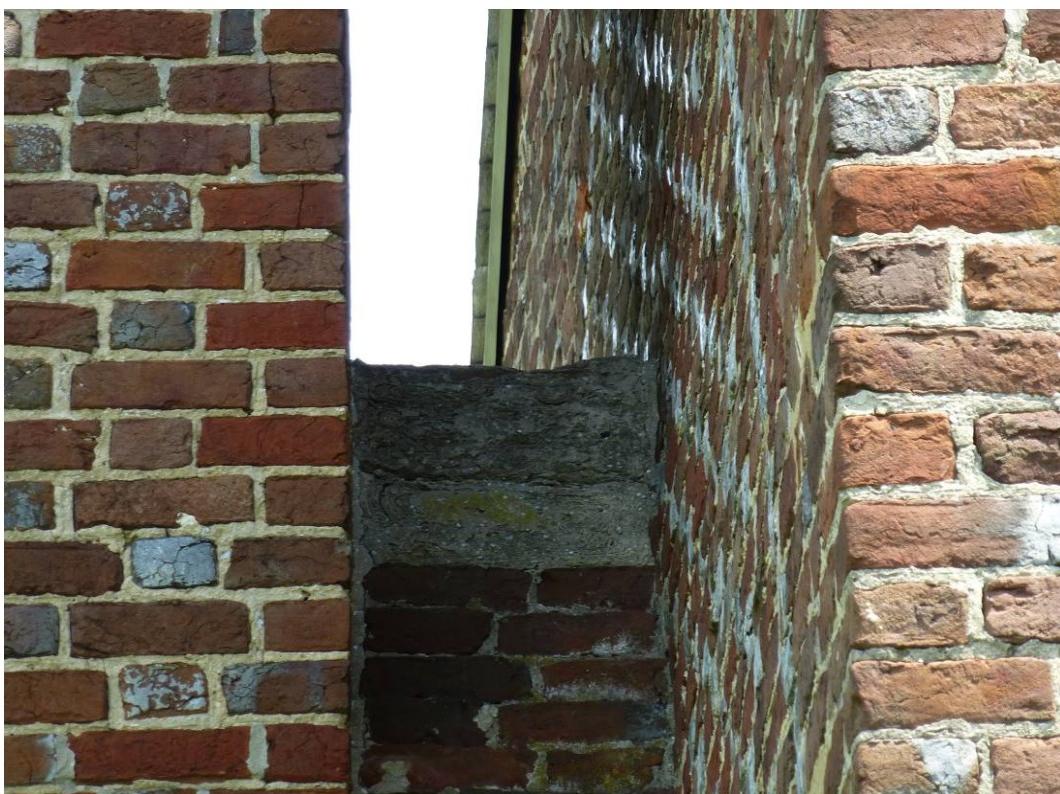


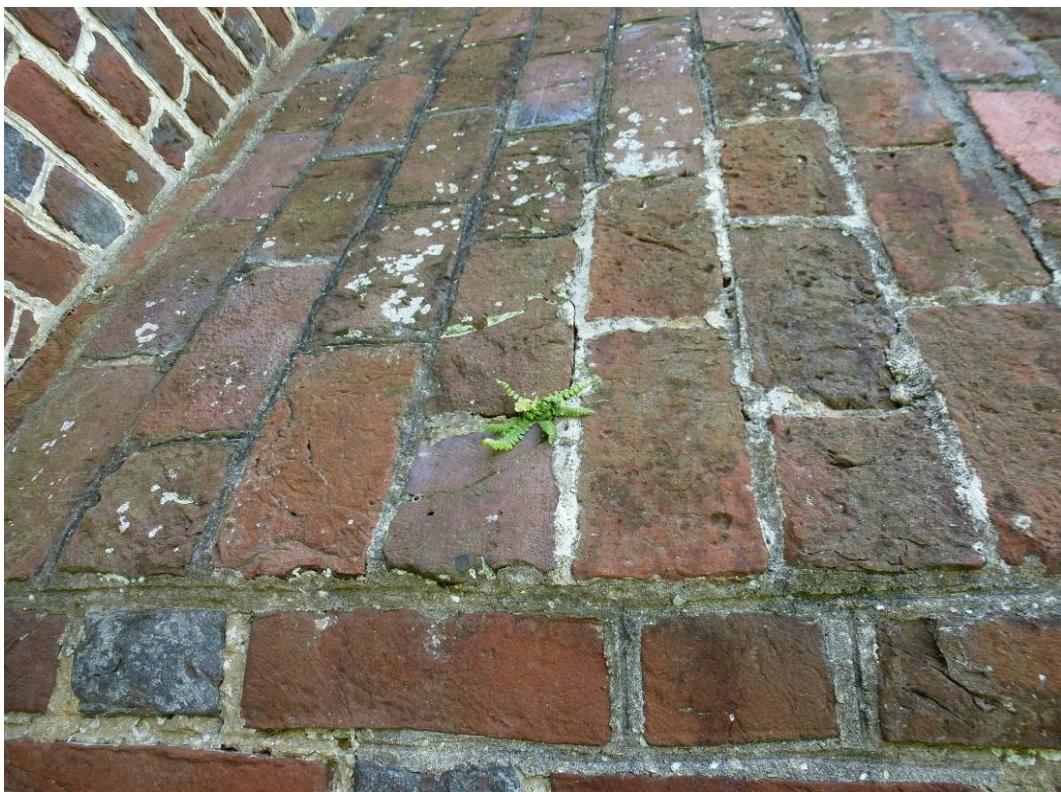
Figure 73. Growth/stains on the top of the chimney brickwork (ERDC-CERL, 2012).



Figure 74. Efflorescence on the chimney brickwork (ERDC-CERL, 2012).



Figure 75. Vegetation growth on chimney brickwork (ERDC-CERL, 2012).



5.3.3 Brick porch tower

The porch tower on the Matthew Jones house was built during the Period II (ca. 1730) phase. The tower provided a buffered entry and restrained circulation to the entertaining rooms. The exterior walls are bonded into the masonry of the main block of the house.

The brick porch is a two-story masonry structure with a single front-door window on the upper story and two side windows and a front door on the main floor (Figure 76). The jointing used in the brick walls is also important. Relatively white mortar with moderate chunks of shell and lime was used on the exterior during this phase, along with a grapevine joint.²¹

Bright red, rubbed bricks were used on the exterior corners above the water table (including the shed), creating a “quoins” effect. A belt course of gauged and rubbed bricks was used on the tower (Figure 77).²²

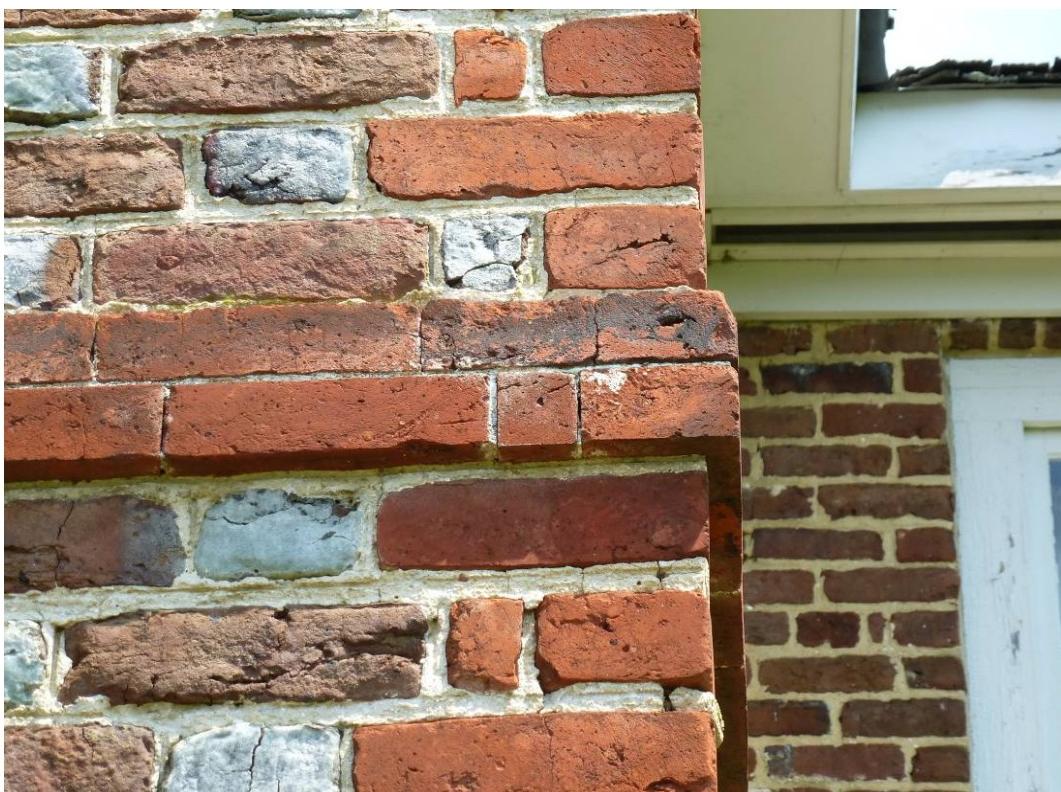
²¹ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 52.

²² *ibid.*, 54.

Figure 76. Two-story brick tower was constructed in Period II (ERDC-CERL, 2012).



Figure 77. A belt course of gauged and rubbed bricks was used on the porch tower (ERDC-CERL, 2012).

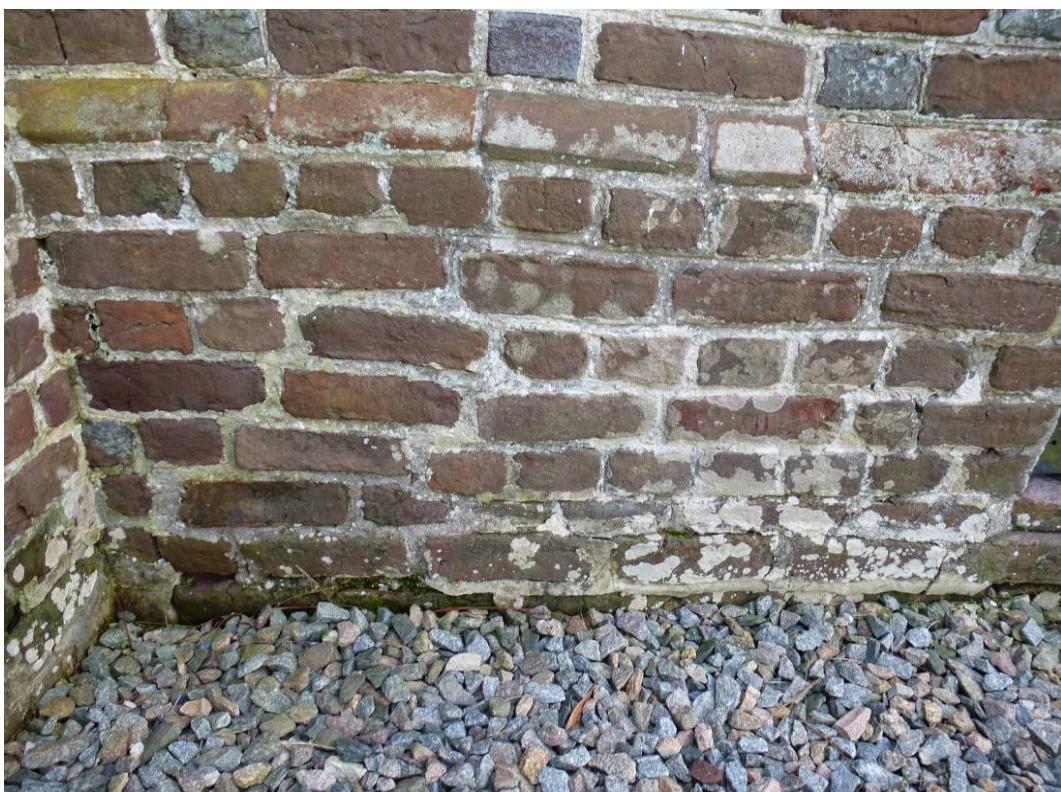


5.3.4 Brick water table

The water table for the exterior walls is higher than on the chimneys and is capped with a beveled brick. For the chimneys, the water table simply steps back 1 3/4" in a horizontal plane. The water table course of brick on the chimneys is laid in Flemish bond with glazed headers, while English bond with random glazing was used on the upper walls.²³

Bricks in the water table in all areas are showing signs of deterioration that is in need of repair (Figure 78–Figure 81).

Figure 78. Lichen growth and efflorescence on the water table caused by rain water shedding from roof and splashing back onto the brickwork (ERDC-CERL, 2012).



²³ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 40.

Figure 79. Deteriorated brick caused by the water that splashes off of the large gravel. This type of deterioration is called erosion (ERDC-CERL, 2012).



Figure 80. Stains and growth on the water table (ERDC-CERL, 2012).



Figure 81. Bricks on the top layer of the water table are showing signs of deterioration called pitting (ERDC-CERL, 2012).



5.3.5 Brick windowsills, lintels, and jambs

The windows on the porch tower, the two windows on the front elevation of the main block, the two windows on the east gable, and the front door have rubbed brick jambs and arches (Figure 82–Figure 85). The semicircular arch over the front door has been rebuilt but follows the original curve (Figure 82).²⁴

²⁴ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 54.

Figure 82. Rubbed brick arch and jambs around the main door on the southwest (front) elevation. The semicircular arch was rebuilt following the original curve. (ERDC-CERL, 2012).

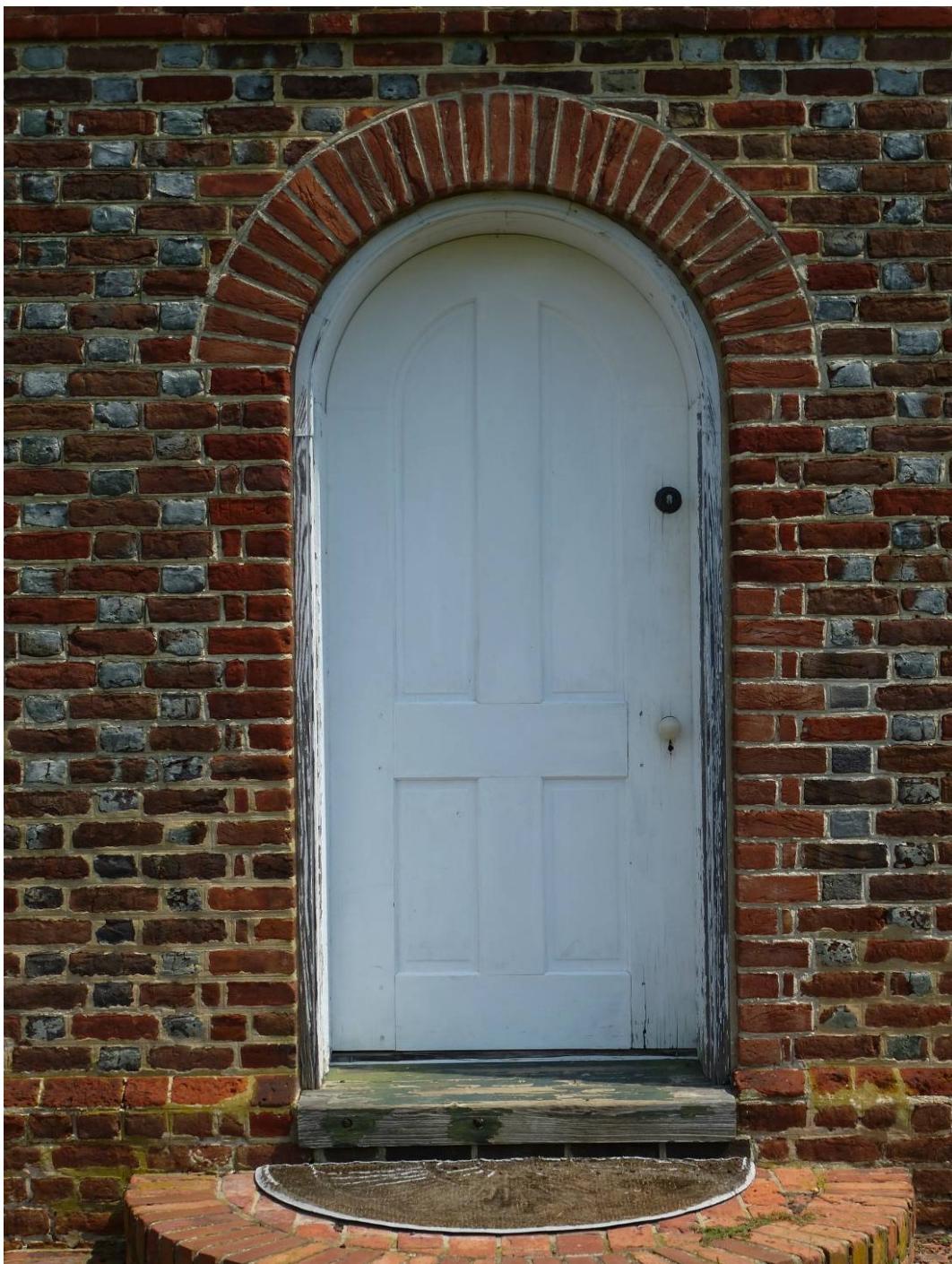


Figure 83. Close-up view of replacement bricks above arched door on the southwest elevation (ERDC-CERL, 2012).



Figure 84. Rubbed brick lintel and jamb around wood window (ERDC-CERL, 2012).



Figure 85. Close-up of rubbed brick lintel and jamb around wood window
(ERDC-CERL, 2012).



5.3.6 Brick steps

The brick steps are located in front of the main entry on the southwest elevation. The steps are arranged in a semicircular design with the stretchers face up and are three steps high. The bottom step is one row of bricks, while the middle and top steps are two rows of brick separated by mortar (Figure 86). The exact date for these brick steps is unknown, but they most likely date at least to before the Civil War period. The visible vegetative growth and stains are areas of concern (Figure 86–Figure 87).

Figure 86. Semicircular design of front steps showing vegetation growth (ERDC-CERL, 2012).



Figure 87. Growth and stains on front steps from rain water (ERDC-CERL, 2012).



5.3.7 Deterioration problems

Pitting is the development or existence of small cavities in a masonry surface which may be caused by the differential removal of individual components of the masonry and may be the result of natural weathering or erosion of an inherently porous type of masonry (Figure 54 and Figure 81). To date, no completely effective treatment has been developed for this condition.²⁵

Cracking is a term describing narrow fissures from 1/16"–1½" wide in a block of masonry. Cracking may result from a variety of conditions such as structural settlement of a building or too hard a repointing mortar, or it may be an inherent characteristic of the masonry itself (e.g., unfired brick). Small cracks within a single block of masonry may not be serious, but longer and wider cracks extending over a larger area may be indicative of structural problems and should be monitored (Figure 55).²⁶

Crazing is the formation of a pattern of tiny cracks or crackles in a glaze (Figure 60 and Figure 61). Unless the cracks visibly extend into the porous tile body beneath the glaze, crazing should not be regarded as highly serious material failure. It does; however, tend to increase the water absorption capability of the glazed unit. To date, no completely effective treatment has been developed for this condition.²⁷

Efflorescence is a whitish haze of soluble salts on masonry generally caused by excessive “pulling” of soluble salts into the masonry and out through the surface. In addition, carbonates from lime mortar and air-borne or water-deposited pollutants from the atmosphere may cause sulfates to be deposited on the surface of the masonry. Efflorescence itself may be more unsightly than harmful, but its presence on an older or historic masonry building often serves as a warning by indicating that water has found a point of entry into the structure (Figure 56).²⁸

²⁵ Anne E. Grimmer, *A Glossary of Historic Masonry Deterioration Problems and Preservation Treatments*. (Washington, DC: Department of Interior, National Parks Service, Preservation Assistance Division, 1984). Available at: <http://www.nps.gov/tps/how-to-preserve/preservedocs/Historic-Masonry-Deterioration.pdf>, 17.

²⁶ Ibid., 6.

²⁷ Ibid., 7.

²⁸ Ibid., 11.

Erosion is the wearing away of the surface, edge, corners, or carved details of masonry slowly and usually by the natural action of wind or windblown particles and water (Figure 54).²⁹

Flaking is an early stage of peeling, exfoliation, delamination, or spalling and is best explained as the detachment of small, flat thin pieces of the outer layers of masonry from a larger piece (Figure 59). Flaking is usually caused by capillary moisture or freeze-thaw cycles that occur within the masonry.³⁰

5.3.8 Immediate concerns for masonry

Historic brick masonry is a durable product whose primary source of deterioration is exposure to moisture and water. Historic bricks are generally softer than their modern counterparts, and the original mortars used with them were more flexible than those used currently. Original mortars had a high lime content which allowed the mortar to absorb cyclical movement of the structure, in particular at the critical times of freeze-thaw.

The three most common sources of deterioration of historic brick masonry are prolonged exposure to water, usually due to improper roof drainage; spalling, due to the use of excessively hard repointing mortars; and, exposure to moisture and salts at grade. Signs of deterioration include: (a) rust staining from concealed fasteners, (b) white surface staining or build-up due to the mitigation of salts, (c) cracking and spalling of brick due to water or excessively hard mortar installed during previous repointing efforts, (d) pitting of the softer rubbed bricks, and (e) crazing of the glazed brick headers.

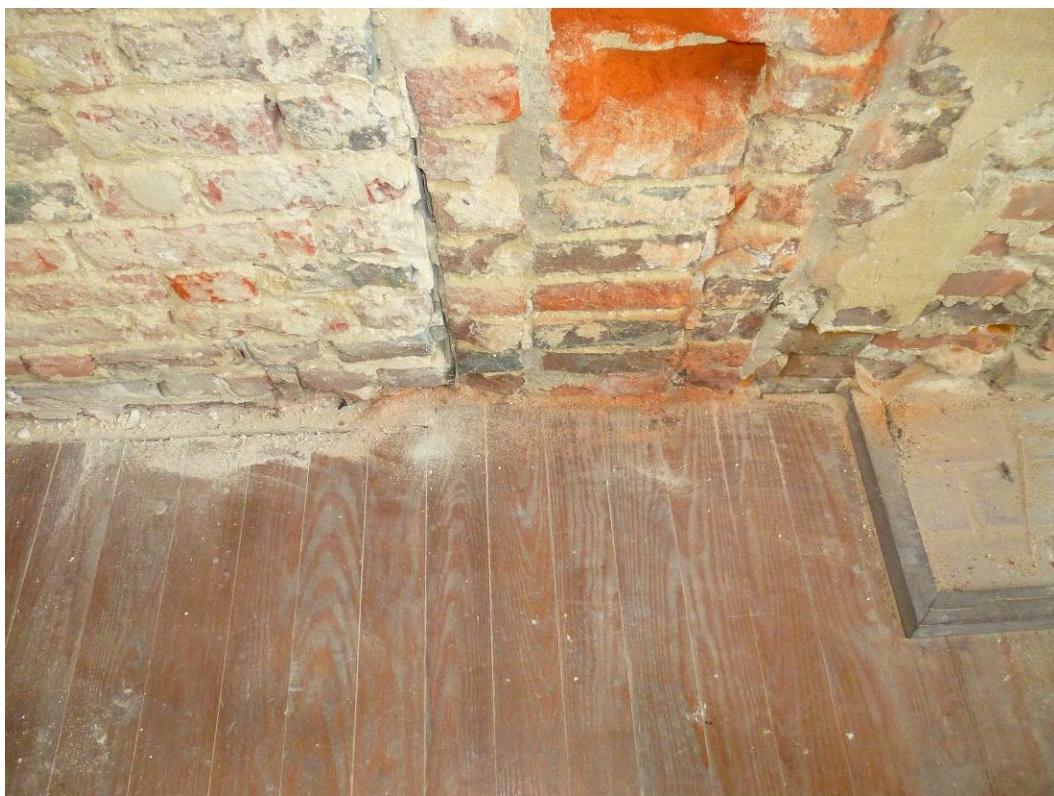
The major concern with the brick and mortar on the Matthew Jones House is directly tied to the improper use and the efficiency of the current HVAC system. There is no insulation of the inside of the exterior brick wall, historically or now. If the house is to be kept as an architectural-study museum, the correct HVAC system is required to control the amount of moisture allowed in the building and on the architectural elements. In addition, the house has been kept too cold as compared to the hot, humid southern summers. The moist cold air from within the house touches the exposed interior side of the brick, while the exterior side of the brick is hot creating

²⁹ Grimmer, *A Glossary of Historic Masonry*, 12.

³⁰ *ibid.*, 14.

moisture and condensation within the bricks. The bricks are ultimately crumbling to pieces. Evidence of this is seen on the interior with the buildup of “brick dust” at the base of each wall (Figure 88).

Figure 88. Interior of brick wall showing the “brick dust” (ERDC-CERL, 2012).



There are cracks in most of the masonry walls. Most of them are minor, but two are of concern. One concern is a large crack that runs vertically along the northwest wall (Figure 55 and Figure 153). The other major crack is located above the second-floor chamber over the hall (Figure 151 and Figure 152). Both of these cracks have formed gaps in the exterior wall where one can see daylight through them, ultimately allowing the elements from the outside into the building. Most cracks are attributed to the expansion of the wood framing on the interior, but the freeze-thaw cycle also contributes to the growth of cracks.

The masonry joints are in good condition. Some of the previous repointing jobs do not match the historic mortar in characteristics or color, such as the “grapevine” joint that was historically used on the Matthew Jones House (Figure 65–Figure 67). Only if mortar has decayed to the point where water penetration will be a problem should repointing be allowed, however.

The brick chimneys are in good structural condition, with the exception of a few cracks probably caused by freeze-thaw and temperature and moisture expansion from the wood framing in the house.

The northeast wall has been restabilized with the 1993 preservation efforts. The reason why it needed to be replaced was in part due to water entering on an upper level, then freezing and expanding the brick. Extra attention should be paid to this wall, and it should be monitored on a regular basis so that the wall does not begin to bulge out again.

Overall care should be taken to protect the original brick and mortar. Where brick masonry is extremely deteriorated, replacement in-kind must occur. Care must be used to select sound and matching bricks for all repairs. Specialty brick is available from a variety of sources, and efforts to identify matching brick units should be required.

The brick and mortar are evaluated as follows:

- the brick and mortar is structurally and architecturally intact, and
- poor patch work over parts of the brick and mortar will need to be replaced (Figure 62 and Figure 65–Figure 67), and
- maintenance of the brick and mortar is needed for it to continue to function as it was designed, and
- cracks need to be evaluated and assessed to determine the cause and severity of the major cracks, and
- major cracks need to be repaired to prevent moisture penetration, and
- cracks need to be monitored on a regular basis, and
- damaged surfaces should be cleaned and repaired as per preservation standards laid out in this manual (Figure 56–Figure 58), and

- repairs are needed as necessary with materials that are like in appearance and mechanical properties, and/or
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years, and/or
- there is a poor repair job which should be cleaned and properly executed.

5.3.9 Maintenance / management guidelines for masonry

According to *The Secretary of Interior's Standards for Rehabilitation*,³¹ the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when necessary.

The following recommendations for care of historic brick are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

Following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at
www.nps.gov/tps/standards/rehabilitation/rehab/masonry01.htm.

Identify, retain, and preserve

Recommended:

- Identifying, retaining, and preserving masonry features that are important in defining the overall historic character of the building such as walls, brackets, railings, cornices, window architraves, door pediments, steps, and columns; and details such as tooling and bonding patterns, coatings, and color.

³¹ Grimmer et al., *The Secretary of the Interior's Standards for Rehabilitation*

Not recommended:

- Removing or radically changing masonry features that are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Replacing or rebuilding a major portion of exterior masonry walls that could be repaired so that, as a result, the building is no longer historic and is essentially new construction.
- Applying paint or other coatings such as stucco to masonry that has been historically unpainted or uncoated to create a new appearance.

*Protect and maintain**Recommended:*

- Protecting and maintaining masonry by providing proper drainage so that water does not stand on flat, horizontal surfaces or accumulate in curved decorative features.
- Cleaning masonry only when necessary to halt deterioration or remove heavy soiling.
- Carrying out masonry surface cleaning tests after it has been determined that such cleaning is appropriate. Tests should be observed over a sufficient period so that both the immediate and the long range effects are known to enable selection of the gentlest method possible.
- Cleaning masonry surfaces with the gentlest method possible, such as low pressure water and detergents, using natural bristle brushes.
- Evaluating the overall condition of the masonry to determine whether more than protection and maintenance are required, that is, if repairs to the masonry features will be necessary.

Not recommended:

- Failing to evaluate and treat the various causes of mortar joint deterioration such as leaking roofs or gutters, differential settlement of the building, capillary action, or extreme weather exposure.
- Cleaning masonry surfaces when they are not heavily soiled to create a new appearance, thus needlessly introducing chemicals or moisture into historic materials.
- Cleaning masonry surfaces without testing or without sufficient time for the testing results to be of value.
- Sandblasting brick or stone surfaces using dry or wet grit or other abrasives. These methods of cleaning permanently erode the surface of the material and accelerate deterioration.
- Using a cleaning method that involves water or liquid chemical solutions when there is any possibility of freezing temperatures.
- Cleaning with chemical products that will damage masonry, such as using acid on limestone or marble, or leaving chemicals on masonry surfaces.
- Applying high pressure water cleaning methods that will damage historic masonry and the mortar joints.

- Failing to undertake adequate measures to assure the protection of masonry features.

Repair

Recommended:

- Repairing masonry walls and other masonry features by repointing the mortar joints where there is evidence of deterioration such as disintegrating mortar, cracks in mortar joints, loose bricks, damp walls, or damaged plasterwork.
- Removing deteriorated mortar by carefully hand raking the joints to avoid damaging the masonry.
- Duplicating old mortar in strength, composition, color, and texture.
- Duplicating old mortar joints in width and in joint profile.
- Repairing masonry features by patching, piecing-in, or consolidating the masonry using recognized preservation methods. Repair may also include the limited replacement in-kind--or with compatible substitute material--of those extensively deteriorated or missing parts of masonry features when there are surviving prototypes such as terra cotta brackets or stone balusters.
- Applying new or non-historic surface treatments such as water-repellent coatings to masonry only after repointing and only if masonry repairs have failed to arrest water penetration problems.

Not recommended:

- Removing non-deteriorated mortar from sound joints, and then repointing the entire building to achieve a uniform appearance.
- Using electric saws and hammers rather than hand tools to remove deteriorated mortar from joints prior to repointing.
- Repointing with mortar of high Portland cement content (unless it is the content of the historic mortar). This can often create a bond that is stronger than the historic material and can cause damage as a result of the differing coefficient of expansion and the differing porosity of the material and the mortar.
- Repointing with a synthetic caulking compound.
- Using a "scrub" coating technique to repoint instead of traditional repointing methods.
- Changing the width or joint profile when repointing.
- Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the masonry feature or that is physically or chemically incompatible.
- Applying waterproof, water repellent, or non-historic coatings such as stucco to masonry as a substitute for repointing and masonry repairs. Coatings are frequently unnecessary, expensive, and may change the appearance of historic masonry as well as accelerate its deterioration.

Replace

Recommended:

- Replacing in-kind an entire masonry feature that is too deteriorated to repair--if the overall form and detailing are still evident--using the physical evidence as a model to reproduce the feature. Examples can include large sections of a wall, a cornice, balustrade, column, or stairway. If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.

Not recommended:

- Removing a masonry feature that is unrepairable and not replacing it; or replacing it with a new feature that does not convey the same visual appearance.

5.4 Roofing

5.4.1 Wood shingles

A weathertight roof is basic in the preservation of a structure, regardless of the structure's age, size, or design. During many periods in the history of architecture, the roof imparts much of the architectural character, but no matter how decorative the patterning or how compelling the form, the roof is a highly vulnerable element of shelter that will inevitably fail. A poor roof will permit the accelerated deterioration of historic building materials (e.g., masonry, wood, plaster, paint) and will cause general disintegration of the basic structure. Furthermore, there is an urgency involved in repairing a leaky roof, since continued deterioration means the repair cost will quickly become prohibitive. Although complete repair or replacement is desirable as soon as a failure is discovered, temporary patching methods should be carefully chosen to prevent inadvertent damage to sound or historic roofing materials and related features.³²

Historically, wooden shingles were usually thin (3/8"-3/4"), relatively narrow (3'-8"), of varying length (14"-36"), and almost always smooth. The traditional method for making wooden shingles in the seventeenth and eighteenth centuries was to hand split them from log sections known as bolts. These bolts were quartered or split into wedges. A mallet and froe (or ax) were used to split or rive out thin planks of wood along the grain. If a tapered shingle was desired, the bolt was flipped after each successive

³² Excerpt from Sarah M. Sweetser, *Preservation Brief #4: Roofing for Historic Buildings*, (Washington, DC: National Park Service, 2012). For full brief refer to www.gsa.gov/portal/content/113134 or <http://www.nps.gov/tps/how-to-preserve/preservedocs/preservation-briefs/04Preserve-Brief-Roofs.pdf>.

strike with the froe and mallet. The wood species varied according to available local woods, but only the heartwood, or inner section, of the log was usually used. The softer sapwood generally was not used because it deteriorated quickly. Because hand-split shingles were somewhat irregular along the split surface, it was necessary to dress or plane the shingles on a shaving horse with a draw-knife or draw-shave to make them fit evenly on the roof. This reworking was necessary to provide a tight-fitting roof over typically open-shingle lath or sheathing boards. Dressing, or smoothing of shingles, was almost universal no matter what wood was used or in what part of the country the building was located, except in those cases where a temporary or very utilitarian roof was needed.³³

Historic buildings in the South were roofed with cypress and oak wooden shingles, a combustible building product. For historic buildings, fire-rated shingles can provide additional protection to irreplaceable resources. Although many federally owned historic buildings are generally not governed by specific codes, it is important to design and detail restoration work with long-term protection of the historic resource in mind.

The Matthew Jones House has a side-gable roof over the main block that is clad with cedar wood shingles. The front porch tower has a front-gable roof clad with the same type of wood shingles and the shed room (rear chamber) addition on the northeast elevation is clad with similar materials.

5.4.2 Failures of surface materials

Historically accurate execution of roofing details is important to the appearance and performance of historic building roofs. For these reasons, all projects involving repair, restoration, or replacement of sloped roofs at historic buildings require the services of a preservation architect or architectural conservator to: assess historic roofing conditions and design intent, prepare specifications, locate and confirm the availability of appropriate replacement materials, review sample materials, and oversee execution of restoration work.³⁴ Particular attention should be given to

³³ Excerpt from Sharon C., Park, *Preservation Brief #19: The Repair and Replacement of Historic Wooden Shingle Roofs*. (Washington, DC: US Department of the Interior, National Park Service, Technical Preservation Services, n.d.). For full the full brief, please refer to www.nps.gov/tps/how-to-preserve/briefs/19-wooden-shingle-roofs/htm.

³⁴ Excerpt from Caroline Alderson, *Historic Building Roofing* (Technical Preservation Guidelines series). (Washington, DC: US General Services Administration, Center for Historic Buildings, 2009). For the full guideline, please refer to www.gsa.gov/graphics/pbs/RoofingTechGuide.pdf.

any southern slope because year-round exposure to direct sun may cause it to break down first.

5.4.3 Wood

Some historic roofing materials have limited life expectancies because of normal organic decay and “wear.” For example, the flat surfaces of wood shingles erode from exposure to rain and ultraviolet rays. Some species are harder than others; heartwood, for example, is stronger and more durable than sapwood. Ideally, shingles are split with the grain perpendicular to the surface. This is because if shingles are sawn across the grain, moisture may enter the grain and cause the wood to deteriorate. Prolonged moisture on or in the wood allows moss or fungi to grow, which will further hold the moisture and cause rot.³⁵

Wood-shingle roofs can last from 15 to 60 years, but the shingles should be replaced before there is deterioration of other wooden components of the buildings.

5.4.4 Historic detailing and installation techniques

While the size, shape and finish of the shingle determine the roof’s texture and scale, the installation patterns and details give the roof its unique character. Many details reflect the craft practices of the builders and the architectural style prevalent at the time of construction. Other details had specific purposes for reducing moisture penetration to the structure. In addition to the most visible aspects of a shingle roof, the details at the rake boards, eaves, ridges, hips, dormers, cupolas, gables, and chimneys should not be overlooked.³⁶

The way the shingles were installed was often based on functional and practical needs. Because a roof is the most vulnerable element of a building, many of the roofing details that have become distinctive features were first developed simply to keep water out. Swept valleys and fanned hips keep the grain of the wood in the shingle parallel to the angle of the building joint to aid water runoff. The slight projection of the shingles at the eaves directs the water runoff either into a gutter or off the roof away from the exterior wall. These details varied from region to region and from style

³⁵ Excerpt from Sweetser, *Preservation Brief #4: Roofing for Historic Buildings*.

³⁶ Excerpt from Park, *Preservation Brief #19: The Repair and Replacement of Historic Wooden Shingle Roofs*.

to style. They can be duplicated even with the added protection of modern flashing.³⁷

In order to have a weathertight roof, it was important to have adequate coverage, proper spacing of shingles, and straight-grain shingles. Many roofs were laid on open shingle lath or open sheathing boards. Roofers typically installed three layers of shingles with approximately 1/3 of each shingle exposed to the weather. Spaces between shingles (1/8"–1/2" depending on wood type) allowed the shingles to expand when wet. It was important to stagger each overlapping shingle by a minimum of 1-1/2" to avoid a direct path for moisture to penetrate a joint. Doubling or tripling the starter course at the eave gave added protection to this exposed surface. In order for the roof to lay as flat as possible, the thickness, taper and surface of the shingles was relatively uniform; any unevenness on handsplit shingles had already been smoothed away with a draw-knife. To keep shingles from curling or cupping, the shingle width was generally limited to less than 10".³⁸

The roof of the Matthew Jones House has several condition issues, as shown in Figure 89–Figure 98 and discussed in Section 5.4.5 beginning on page 121.

³⁷ Excerpt from Park, *Preservation Brief #19: The Repair and Replacement of Historic Wooden Shingle Roofs*.

³⁸ ibid.

Figure 89. Cupping of the wood shingles, uniformly across entire roof
(ERDC-CERL, 2012).



Figure 90. Weathered wood shingles, uniformly across entire roof
(ERDC-CERL, 2012).



Figure 91. Mold and lichen growth on wood shingles (ERDC-CERL, 2012).



Figure 92. Wood shingles (ERDC-CERL, 2012).



Figure 93. Flashing at the gable joint on the southeast corner of the main block and porch tower (ERDC-CERL, 2012).



Figure 94. Flashing at the joint of the shed roof and brick wall of main block (ERDC-CERL, 2012).



Figure 95. Metal ridge piece along gable of main block (ERDC-CERL, 2012).



Figure 96. Underside of the wood shingles showing protruding nails and wet roofing members (ERDC-CERL, 2012).

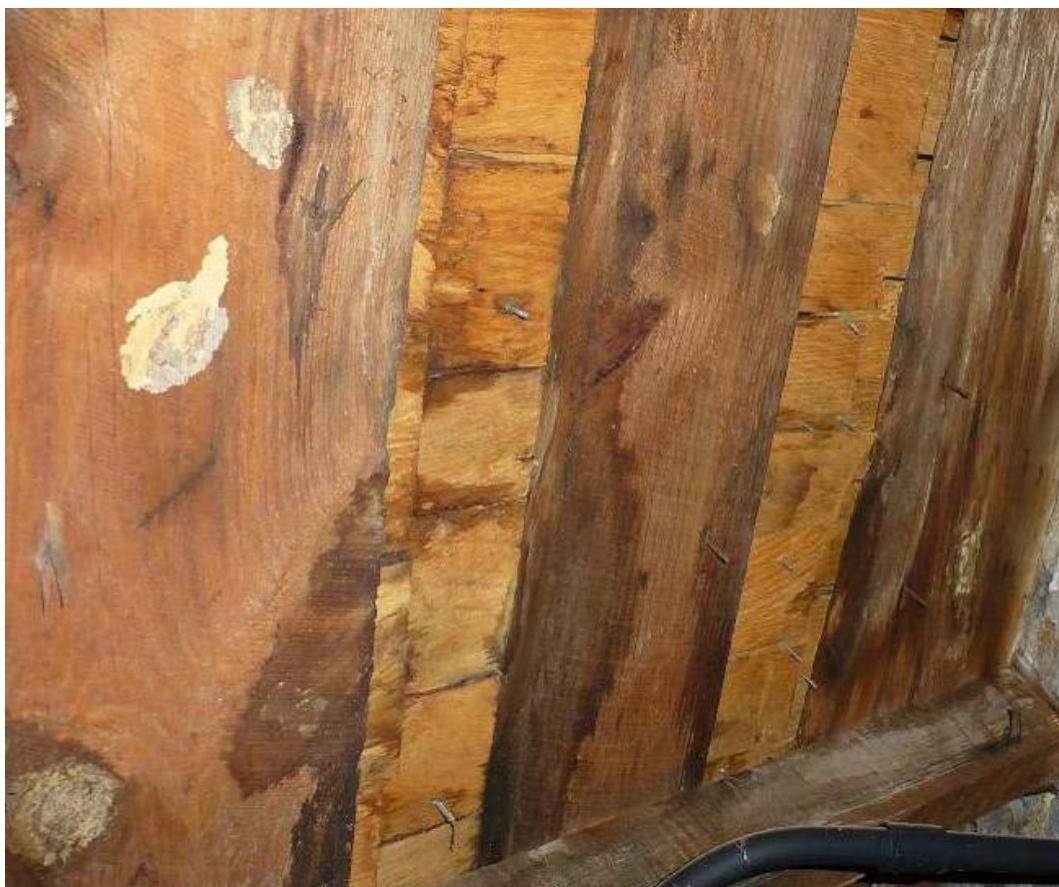
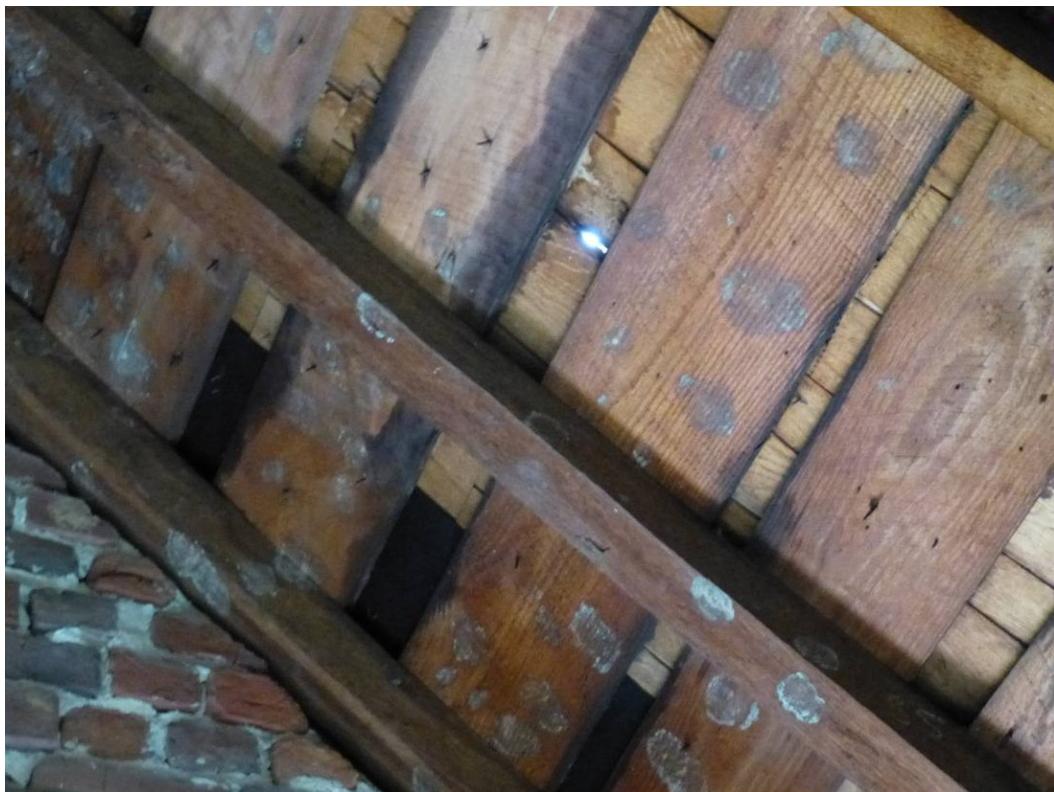


Figure 97. Moisture-soaked roofing members including joists, rafters, and wood shingles (ERDC-CERL, 2012).



Figure 98. Gaps in the wood shingles where you can see light through, and allowing exterior elements to penetrate into the interior of the house (ERDC-CERL, 2012).



5.4.5 Immediate concerns for wood shingles

There are several differences between cedar shakes and cedar shingle. Cedar shakes are thicker than cedar shingles. This makes a cedar shake roof last much longer than a shingle roof. Additionally, cedar shakes are handsplit, while shingles are sawn. Hand-split shakes show the rich wood grain of the cedar. Generally, a shingle is sawn on both sides and is thinner at the butt than a shake, which is typically split on one or both sides.

Shakes are generally made from wood which is split from a block of cedar. However, this is not always the case. Originally, all shakes were split from blocks entirely by hand using a sharp blade called a froe, and a mallet. Some shakes are still manufactured this way, typically for special orders. This splitting technique may be done straight or at an angle, depending on the needs of the customer. Shakes which are split straight to create parallel sides, have sometimes been called "barn shakes". Tapersplit shakes are split at an angle, and are only made with hand tools.

Shingles are always sawn on both sides from a block of cedar. Most shingles are manufactured using a stationary, upright saw. The block of cedar is moved through the path of the saw by a device called a carriage, which holds the wood firmly, but also alternates the angle of the cut with each stroke. After being cut from the block, the sides of each shingle are then trimmed to create square corners on the product. They are used for roof installation, or sent for additional processing to create more tailored side-wall products.³⁹

Gaps in the wood roofing shingles allow water, air, and elements into the interior of the structure (Figure 98). Joint Base Langley-Eustis CRM needs to address the various-sized gaps in the roofing material, as well as the type of material being used as a roof covering. The gaps in the roof might be a result of the current installation of the individual cedar shingles. In the current installation of the shingles, the shingles do not overlap each other enough, therefore creating gaps between the shingles allowing air and water to penetrate into the structure.

Cupping of the individual wood shingles is the overall problem with the wood roof of the Matthew Jones House (Figure 89–Figure 90). Cupping is caused by uneven moisture absorption and drying. As wood absorbs mois-

³⁹ Excerpt from Gerald M. Chicalo, "Cedar Shakes: Shake FAQs." Online resource available at: http://www.chicalo.com/shake_lasqueti/shake_block_cutting/faq.htm

ture, water fills the space between the wood cells and causes the wood to swell. As wood dries, water leaves the spaces and the wood shrinks. The undersides of shakes and shingles often dry more slowly than the exposed faces. The exposed faces will shrink as they dry, but the underside will still be full of water and thus, remain in an expanded condition.

Ventilation system problems have also added to the disintegration of the individual wood shingles. Cupping of the shingles is due to the moisture in the air produced from the air condition unit not being calibrated correctly for the structure, as a result from the poor ventilation system used within the structure. The current shingles were installed in 1993. An expected lifespan of a cedar roof is anywhere between 15-20 years but some higher quality shake/shingle can last up to 50 years.

The wood-shingled roof (Figure 89–Figure 98) is evaluated as follows:

- the roof is structurally and architecturally not sound but performing its intended purpose, and
- there are several cosmetic imperfections, and
- the roof is not inspected yearly for signs of wearing or failure, and
- the roofing material is deteriorating and beyond repair, and the roofing is inspected yearly for wear and localized failure, and/or roofing is replaced where it no longer functions to maximum capacity, and/or
- if inspection reveals globalized damage, then entire roof should be replaced.

Wholesale replacement of the roof is a must in order to preserve the Matthew Jones House. Replacement shingles should match the original shingles in material, size, and shape. Please refer to Figure 99 and Figure 100 for accurate examples of replacement wood shingles.

The new roof should have the best quality wood with a similar surface texture as the original roof. Western red cedar, eastern white pine, and white oak are generally available. All shingles shall be No. 1 grade, or “edge grain” and be heartwood (not sapwood), without knots. The owner or ar-

chitect should inspect the material prior to installation. Fire-retardants or preservative treatments are encouraged on wood shingles if visual impact is minimal (no color additives, paints, or stains). Pressure-impregnated shingles are preferred over chemical treatments to the surface. All shingles shall be at least B rated for fire, with "A" rating preferred. Shingle nails with creosote treatment are preferred, but should be at least double hot-dipped galvanized nails to penetrate sheathing totally. No pneumatic staples or staples of any kind.⁴⁰

Remove the existing roofing material down to the existing spaced sheathing. New wood shingles should be applied directly to the space sheathing below. Felts and coverings shall only be used on the overhang areas. Wood decking should be in good repair, and be repaired or replaced as needed. If any decking is replaced, new lumber should match original in lumber type and size. If full-size lumber was used originally, then new should match in size. No plywood or modern composition boards should be used. Generally speaking, it is preferred NOT to install new wood shingle roofs to roofs with solid decking.⁴¹

New metal valleys and flashings should be used where water is channeled off roof, where roof abuts a vertical wall, chimney or other vertical protrusion, and where structural members join a roof at intersecting angles. All flashings and valleys should be heavy gauge metal, pre-painted both sides, and any flashing strips bent to sharp angles should also be painted after bending. Paint colors should correspond closely with the completed roof color. Metal flashings are required for all roof transitions, at skylights, chimneys, etc. and should generally be at least 3" minimum in height with minimum 6" deep flashing for bottom apron. Valley metal should be a minimum of 8" long, with metal extending 12" minimum on either side of valley centerline, and be cut at the correct angle.⁴²

Roofs should have good attic ventilation to prevent moisture from condensing on the undersurface of the shingles or roof decks. Vents are generally needed at eaves and gable ends (and without affecting historic char-

⁴⁰ Excerpt from City of Phoenix. "Wood Shingle Roofs." TRT/DOC/00084. (Phoenix, AZ: City of Phoenix Planning & Development Department, Historic Preservation Office, 2012.). Available at http://phoenix.gov/webcms/groups/internet/@inter/@dept/@dsd/documents/web_content/pdd_hp_pdf_00084.pdf

⁴¹ ibid.

⁴² ibid.

acter). Attic fans may also be beneficial, supplying additional movement of air in attic spaces.⁴³

Replacement of the roofing material may not be an adverse effect, depending on the type of replacement material used; however, the roof is such a main character-defining feature that SHPO concurrence is recommended.

Figure 99. Example of wood shingle roof (photo taken at Colonial Williamsburg, Virginia; ERDC-CERL, 2012).



⁴³ Excerpt from City of Phoenix, "Wood Shingle Roofs."

Figure 100. Example of a correctly installed cedar shingle roof at the ridge (photo taken at Yorktown, Virginia; ERDC-CERL, 2012).



5.4.6 Maintenance / management guidelines for historic roofing

According to *The Secretary of Interior's Standards for Rehabilitation*,⁴⁴ the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic roofing are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at www.nps.gov/tps/standards/rehabilitation/rehabs01.htm.

⁴⁴ Grimmer et al., *The Secretary of the Interior's Standards for Rehabilitation*.

*Identify, retain, and preserve**Recommended:*

- Identifying, retaining, and preserving roofs--and their functional and decorative features--that are important in defining the overall historic character of the building.
- This includes the roof's shape, such as hipped, gambrel, and mansard; decorative features, such as cupolas, cresting chimneys, and weathervanes; and roofing material such as slate, wood, clay tile, and metal, as well as its size, color, and patterning.

Not recommended:

- Radically changing, damaging, or destroying roofs, which are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Removing a major portion of the roof or roofing material that is repairable, and then reconstructing it with new material in order to create a uniform or "improved" appearance.
- Changing the configuration of a roof by adding new features such as vents, or skylights so that the historic character is diminished.
- Applying paint or other coatings to roofing material, which has been historically uncoated.

*Protect and maintain**Recommended:*

- Protecting and maintaining a roof by checking the roof sheathing for proper venting to prevent moisture condensation and water penetration; and to insure that materials are free from insect infestation.
- Providing adequate anchorage for roofing material to guard against wind damage and moisture penetration.
- Protecting a leaking roof with plywood and building paper until it can be properly repaired.

Not recommended:

- Allowing roof fasteners, such as nails and clips to corrode so that roofing material is subject to accelerated deterioration.
- Permitting a leaking roof to remain unprotected so that accelerated deterioration of historic building materials—masonry, wood, plaster, paint, and structural members—occurs.

*Repair**Recommended:*

- Repairing a roof by reinforcing the historic materials, which comprise roof features.
- Repairs will also generally include the limited replacement in-kind--or with compatible substitute material--of those extensively deteriorated or missing parts of

features when there are surviving prototypes such as cupola louvers, dentils, dormer roofing; or slates, tiles, or wood shingles on a main roof.

Not recommended:

- Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the roof or that is physically or chemically incompatible.

Replace

Recommended:

- Replacing in-kind an entire feature of the roof that is too deteriorated to repair--if the overall form and detailing are still evident--using the physical evidence as a model to reproduce the feature. Examples can include a large section of roofing, or a dormer or chimney.
- If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.

Not recommended:

- Removing a feature of the roof that is irreparable, such as a chimney or dormer, and not replacing it; or replacing it with a new feature that does not convey the same visual appearance.

5.4.7 Replacing deteriorated roofs: matching the historic appearance⁴⁵

Historic wooden roofs using straight edge-grain heartwood shingles have been known to last over sixty years. Fifteen to thirty years, however, is a more realistic lifespan for most premium modern wooden shingle roofs.

Contributing factors to deterioration include the thinness of the shingle, the durability of the wood species used, the exposure to the sun, the slope of the roof, the presence of lichens or moss growing on the shingle, poor ventilation levels under the shingle or in the roof, the presence of overhanging tree limbs, pollutants in the air, the original installation method, and the history of the roof maintenance. Erosion of the softer wood within the growth rings is caused by rainwater, wind, grit, fungus, and the breakdown of cells by ultraviolet rays in sunlight. If the shingles cannot adequately dry between rains, if moss and lichens are allowed to grow, or if debris is not removed from the roof, moisture will be held in the wood and accelerate deterioration. Moisture trapped under the shingle, condensation, or poorly ventilated attics will also accelerate deterioration.

⁴⁵ Excerpt from Park, *Preservation Brief #19: The Repair and Replacement of Historic Wooden Shingle Roofs*.

In addition to the eventual deterioration of wooden shingles, impact from falling branches and workmen walking on the roof can cause localized damage. If, however, over 20% of the shingles on any one surface appear eroded, cracked, cupped, or split, or if there is evidence of pervasive moisture damage in the attic, replacement should be considered. If only a few shingles are missing or damaged, selective replacement may be possible. For limited replacement, the old shingle is removed and a new shingle can be inserted and held in place with a thin metal tab, or "babbie." This reduces disturbance to the sound shingles above. In instances where a few shingles have been cracked or the joint of overlapping shingles is aligned and thus forms a passage for water penetration, a metal flashing piece slipped under the shingle can stop moisture temporarily. If moisture is getting into the attic, repairs must be made quickly to prevent deterioration of the roof structural framing members.

When damage is extensive, replacement of the shingles will be necessary, but the historic sheathing or shingle lath under the shingles may be in satisfactory condition. Often, the historic sheathing or shingle laths, by their size, placement, location of early nail holes, and water stain marks, can give important information regarding the early shingles used. Before specifying a replacement roof, it is important to establish the original shingle material, configuration, detailing and installation. If the historic shingles are still in place, it is best to remove several to determine the size, shape, exposure length, and special features from the unweathered portions. If there are already replacement shingles on the roof, it may be necessary to verify through photographic or other research whether the shingles currently on the roof were an accurate replacement of the historic shingles.

5.5 Exterior wood

5.5.1 Wood doors

The exterior wood doors are hinged. They are used for opening and closing an entrance to a building, room, or cabinet. Exterior doors protect from the elements, provide safety, and provide accessibility in case of fire. Interior doors act as noise barriers, provide privacy, and serve to separate different uses inside the building.

The Matthew Jones House has two entrances to the main building and one entrance to the basement. The arched front door on the southwest elevation appears to be original and true to Period II when it was added to the house (Figure 101–Figure 103). However, the single entry side door locat-

ed on the southeast elevation is a Period III door type (Figure 104) and should be replaced with a Period II door type.

It is unknown what the original configuration of the entrance into the cellar was; it appears now to be different from the historic photograph (Figure 5). Currently, access to the cellar is through a modern bulkhead on the center of the rear of the shed. The present door opening aligns with that in the interior brick partition wall, with two wood slat doors attached with metal strap hinges. At the time of the initial site visit in 2012 to the Matthew Jones House, the two cellar doors were badly deteriorated (Figure 106), but they have since been replaced.

The overall condition of the doors of the Matthew Jones House is relatively good. However, there are some condition issues for the front door, as shown in Figure 102–Figure 103, and for the side door and wood cellar door as shown in Figure 105–Figure 106.

Figure 101. Arched wood door located on the southwest (front) elevation (ERDC-CERL, 2012).

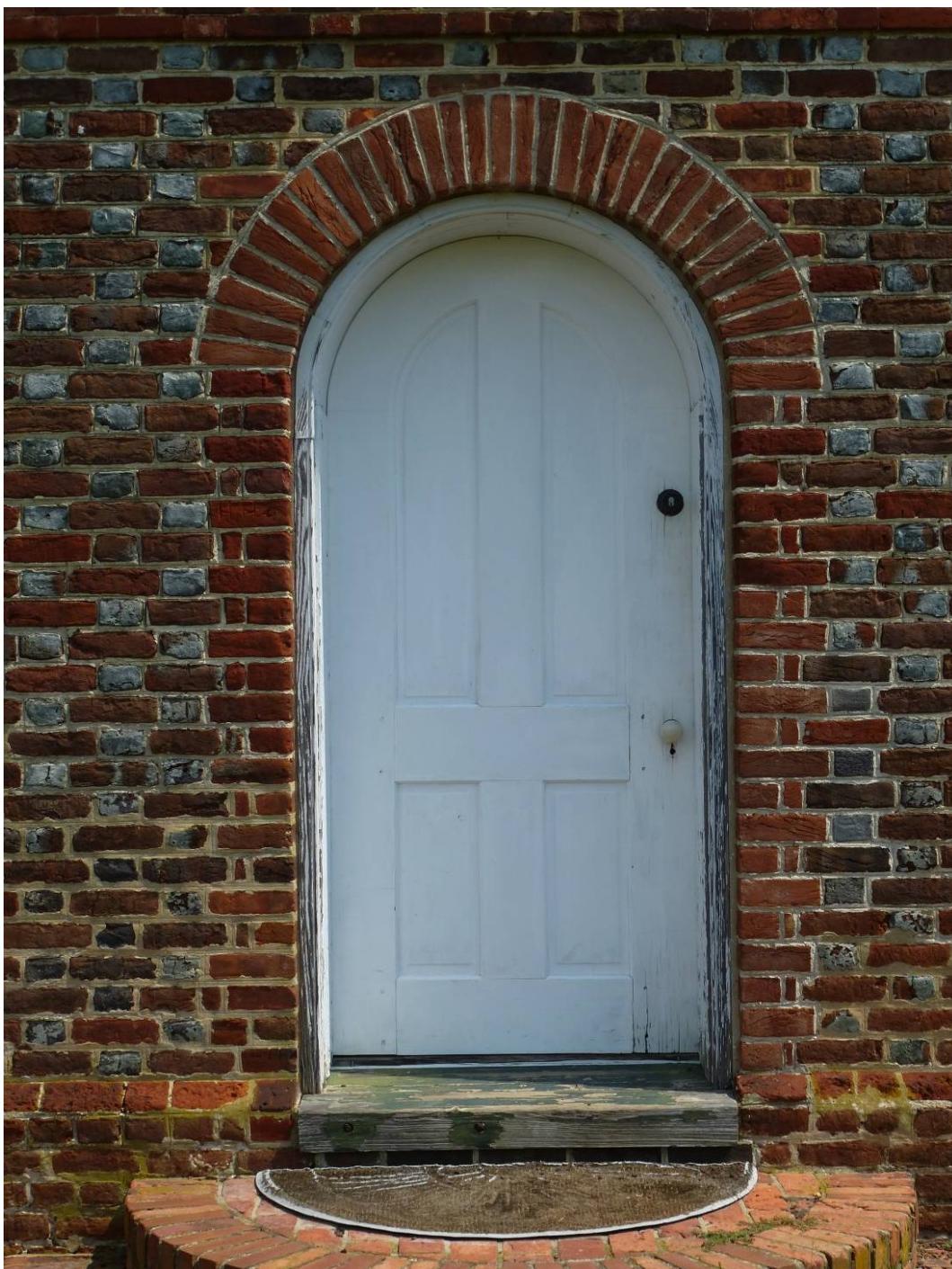


Figure 102. Wood threshold for the main door with chipped paint
(ERDC-CERL, 2012).



Figure 103. Glued arched jamb of the front door (ERDC-CERL, 2012).



Figure 104. Side door on the southeast elevation (ERDC-CERL, 2012).



Figure 105. Deteriorated wood threshold for the side door is too damaged for repair and needs to be replaced (ERDC-CERL, 2012).



Figure 106. Damaged wood cellar doors have been replaced since this photograph was taken (ERDC-CERL, 2012).

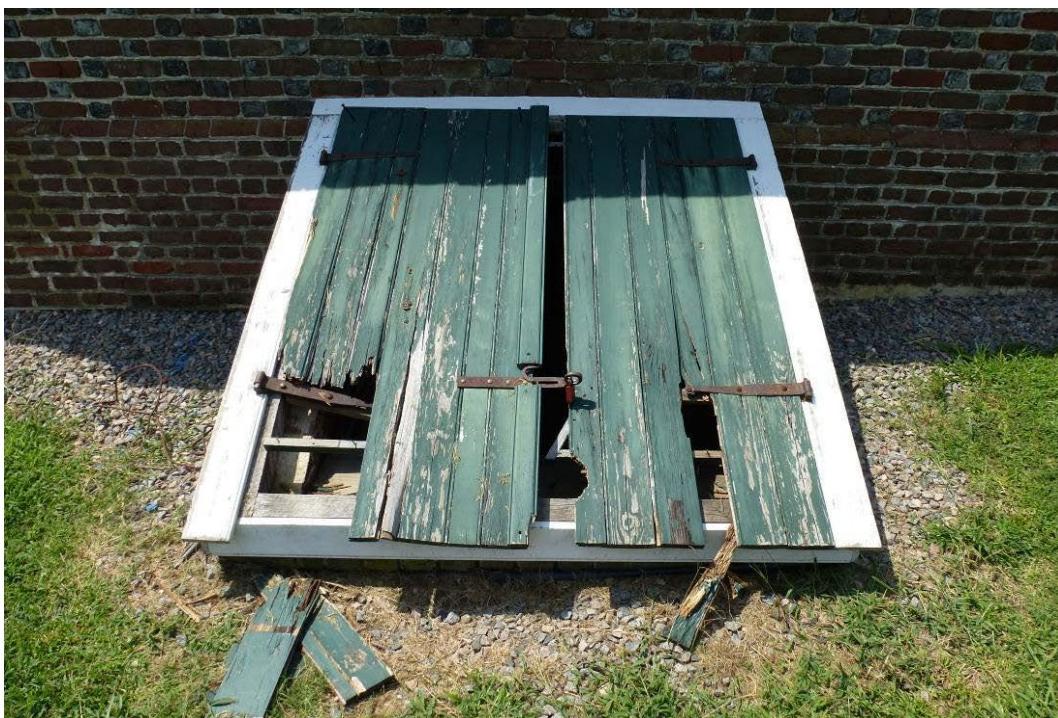


Figure 107. The insect growth/nests should be removed from all wood members (ERDC-CERL, 2012).



5.5.2 Immediate concerns for wood doors

The doors represent a substantial amount of historic fabric; they contribute to the significance and historic appearance of the Matthew Jones House and thus, are an integral part of the building's historic construction.

Since the time of the initial site visit to the Matthew Jones House, the staff in the CRM Office at Joint Base Langley-Eustis have removed and replaced the deteriorated and damaged wood cellar doors in-kind with new wood cellar doors (Figure 109). A note to keep in mind is that a house of this era did not have any type of gutter systems; therefore, the wood hatch doors into the basement will always be susceptible to water damage, especially since these doors take on rainwater from both slopes of the house roof and also from the shed roof of the appendage located on the rear of the building. Joint Base Langley-Eustis will either have to budget money to continually repair cellar doors or install a drainage system to divert water away from the structure. Either action will require SHPO concurrence.

The door located on the southeast elevation should be removed and replaced with an in-kind door style of 1893 design (Figure 108).

Figure 108. Example of entry door to replace the current side door on the southeast elevation of the Matthew Jones House (photo taken at Colonial Williamsburg, Virginia; ERDC-CERL, 2012).



The wood doors are evaluated as follows:

- the door on the southeast elevation needs to be removed and replaced with a historically sensitive door (Figure 104 and Figure 108), and
- the wood frame around each door needs to be repainted (Figure 103), and
- the threshold for the main door on the southwest elevation needs to be repainted (Figure 102), and
- the threshold for the side door on the southeast elevation is too deteriorated to rehabilitate and needs to be removed and replaced with in-kind materials (Figure 105), and

- monitor the cellar doors for water damage and maintenance; ; if beyond repair, replace with accurate door types (Figure 110), and
- the wood is scraped, primed, and repainted, and/or
- any broken elements are repaired or replaced as necessary, and
- any repairs to the wood are made after cleaning the surface gently if necessary, and/or
- damaged wood is repaired and treated as per preservation standards, and/or
- insect growth/nests are removed from all wood members (bee/wasp hives) (Figure 107), and
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems.

Figure 109. Along with Fort Eustis CRM staff, soldiers volunteered time to replace the cellar doors (Fort Eustis Cultural Resources, 2013).



Figure 110. Example of wood cellar doors in an appropriate style for the Matthew Jones House (photo taken at Colonial Williamsburg, Virginia; ERDC-CERL, 2012).



5.5.3 Maintenance / management guidelines for historic wood doors

According to *The Secretary of Interior's Standards for Rehabilitation*,⁴⁶ the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic wood doors are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following list is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at www.nps.gov/tps/standards/rehabilitation/rehab/wood01.htm.

Protect and maintain

Recommended:

- Regular cleaning and removal of loose paint prior to reapplication with specification-approved finish.
- Install and maintain caulk and weather-strip on exterior units to maximize energy efficiency.
- Periodic lubrication of operable hinges and hardware to extend life and inhibit corrosion.

Not recommended:

- Applying excessive layers of paint to hardware, introducing new or non-specified brands of paint, colors, or methods of application.

Repair

Recommended:

- Repair missing hardware or doors with salvage or in-kind material.
- Repainting doorframes by patching, splicing, consolidating or otherwise reinforcing.

Not recommended:

- Replacing an entire door when repair of materials and limited replacement of deteriorated or missing parts is appropriate.
- Failing to reuse serviceable door hardware.

⁴⁶ Grimmer et al., *The Secretary of the Interior's Standards for Rehabilitation*

- Using substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the door or that is physically or chemically incompatible.

Replace

Recommended:

- Restore, repair and reutilize original remaining material, including wood frames, surrounds, and sills, as much as is practicable.
- Replace non-original doors and hardware with salvage of in-kind, specification-approved units painted to match original Replacement units should be permanently dated in an inconspicuous location.

Not recommended:

- Using a substitute unit that is physically incompatible with the character of the historic original doors.

5.5.4 Wood windows

Windows are character-defining features and an important part of every historic building's original design. Basic window functions include admitting light to the interior spaces, providing fresh air and ventilation to the interior, providing a visual link to the outside world, and enhancing the appearance of a building. Windows are unique to the design of a building because they serve as both interior and exterior features.

In the eighteenth century, structural members were connected with joints, usually mortise and tenons or lap joints instead of modern system of butt-joints and nailing them. The absence of any joints on the underside of the plate that is visible on the interior on the northeast wall is an indication that a five-foot window was originally situated here, immediately below the plate. The width of the window suggests that it was a casement with small square or diamond panes held together with lead "cames." Casement (or hinged) windows were common in the seventeenth century, but were quickly replaced in the early eighteenth century with sash windows.⁴⁷

⁴⁷ Dexter Woodward, Paul Gallimore, United States Army Corps of Engineers (Norfolk District), United States Army Training and Doctrine Command, United States Army Transportation Corps, Colonial Williamsburg Foundation, Department of Historic Resources (Williamsport VA), Historic Preservation Training Center (Harpers Ferry Center), and E.L. Hamm & Associates, "The Matthew Jones House at Fort Eustis, Virginia: A Case Study of Historic Preservation," videocassette and accompanying booklet. Norfolk, VA: Norfolk District, US Army Corps of Engineers, page 6.

All windows in the Matthew Jones House are placed in punched openings and are regular and symmetrical in appearance. All of the windows have wood frames that are currently painted white on the exterior and brown on the interior. The majority of the windows are double-hung two-over-two (Figure 111) with the exception of two of the windows being one-over-one located on the shed room (rear chamber) addition (Figure 113). There also is one small, fixed frame, single-pane cellar window on the northwest side of the shed addition (Figure 114).

Figure 111. Second-floor Period III two-over-two wood window that should remain in place (ERDC-CERL, 2012).



Figure 112. First-floor Period III window that needs to be replaced with an accurate Period II window (ERDC-CERL, 2012).



Figure 113. A two-over-two wood window on the main block and a one-over-one wood window on the southeast elevation of the shed room (rear chamber) addition that need to be replaced with an accurate Period II windows (ERDC-CERL, 2012).

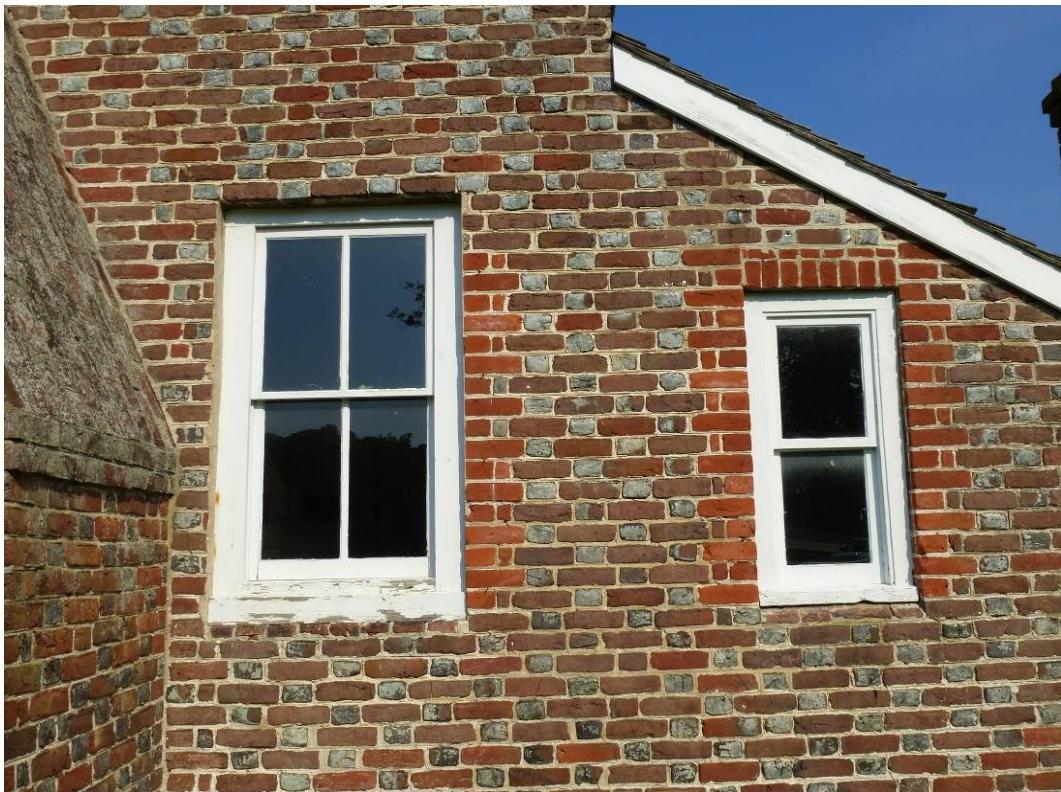


Figure 114. Single-pane cellar window (ERDC-CERL, 2012).



Figure 115. Deterioration of paint on wood window frame and sash
(ERDC-CERL, 2012).



Figure 116. Detail of a damaged wood window frame (ERDC-CERL, 2012).



Figure 117. Stains on wood window frame need to be removed (ERDC-CERL, 2012).



Figure 118. Cracked window pane that even has a hole in it that lets elements into the building (ERDC-CERL, 2012).



5.5.5 Immediate concerns for wood windows

If any work is done on the wood windows, it should be sympathetic to the significant qualities of the historic property. The evaluation of the windows should include consideration of the following elements: the promi-

nence of the window location; the condition of the paint, frame, sill, and sash (rails, stiles, and muntins); glazing problems; hardware; and the overall condition of the window. The results of this evaluation should be documented on a window survey addressing the individual components (generally) of each window at a building.

Since the Matthew Jones House is currently being used as an architectural-study museum, it is recommended that the first-floor two-over-two double-hung windows (Period III; Figure 119) be removed and replaced with more accurate Period II windows in order to accurately tell the history and construction of the house. There are seven of these windows on the first floor. This action requires review by a qualified architectural historian.

Figure 119. Example of wood window to replace the first-floor windows on the Matthew Jones House (photo taken at Colonial Williamsburg, Virginia; ERDC-CERL, 2012).



Some of the windows are currently painted shut. The build-up of paint must be loosened so that the sash becomes operable. Natural ventilation and the original intent of the window to be functional are important characteristics significant to the historic significance of the building.

A physical evaluation of the windows is necessary to determine if the windows have decayed due to moisture infiltration. Paint has deteriorated in several locations.

Repair of wood windows is usually labor intensive but not complicated. Repairs usually involve removal of interior and/or exterior paint; removal and repair of sash; repairs to the frame; weather stripping and reinstallation of the sash; and repainting. Where damage of the sash is extensive, repairs may include treatment of decayed wood with fungicide, waterproofing, filling of cracks and holes with putty, and painting. Isolated deteriorated members may be replaced in-kind, repaired with small "Dutchman" inserts, or repaired with epoxy in limited areas. Replacement windows should match the original exactly in method of operation, daylight opening, light configuration, molding and frame profile, and sill detail.

The wood frame sash windows (Figure 111–Figure 118) are evaluated as follows:

- the wood frame windows are structurally intact and performing their intended purpose, and
- wood frame of the windows be striped and painted according to the standards (Figure 115), and
- the deteriorated or damaged wood frame members be repaired according to the standards (Figure 116), and /or
- when individual damaged window panes are replaced, do not replace the entire window (Figure 118), and
- the inside of the wood windows and trim are cleaned in order to maintain the historic appearance, and

- the glazing compound or putty around glass panels should be examined, and
- any repairs to the wood are made after cleaning the surface gently if necessary, and/or
- the decision to replace should be based on an extensive evaluation of all (or typical) windows, replacement in substitute materials is not acceptable, and
- replaced in-kind (Figure 119), and
- standard preventive maintenance practices and building conservation methods have not been followed.

5.5.6 Maintenance / management guidelines

According to *The Secretary of Interior's Standards for Rehabilitation*,⁴⁸ the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the wood windows are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at www.nps.gov/tps/standards/rehabilitation/rehab/windows01.htm.

Identify, retain, and preserve

Recommended:

- Identifying, retaining, and preserving windows--and their functional and decorative features--that are important in defining the overall historic character of the building.
- Such features can include frames, sash, muntins, glazing, sills, heads, hood-molds, paneled or decorated jambs and moldings, and interior and exterior shutters and blinds.

⁴⁸ Grimmer et al., *The Secretary of the Interior's Standards for Rehabilitation*.

Not recommended:

- Removing or radically changing windows that are important in defining the historic character of the building so that, as a result, the character is diminished.
- Changing the number, location, size, or glazing pattern of windows, through cutting new openings, blocking-in windows, and installing replacement sash that do not fit the historic window opening.
- Changing the historic appearance of windows using inappropriate designs, materials, finishes, or colors that noticeably change the sash, depth of reveal, and muntin configuration; the reflectivity and color of the glazing; or the appearance of the frame.
- Obscuring historic window trim with metal or other material.
- Stripping windows of historic material such as wood, cast iron, and bronze.
- Replacing windows solely because of peeling paint, broken glass, stuck sash, and high air infiltration. These conditions, in themselves, are no indication that windows are beyond repair.

*Protect and maintain**Recommended:*

- Protecting and maintaining the wood and architectural metal that comprise the window frame, sash, muntins, and surrounds through appropriate surface treatments such as cleaning, rust removal, limited paint removal, and re-application of protective coating systems.
- Evaluating the overall condition of materials to determine whether more than protection and maintenance are required, i.e. if repairs to windows and window features will be required.

Not recommended:

- Failing to provide adequate protection of materials on a cyclical basis so that deterioration of the window material is accelerated.
- Retrofitting or replacing windows rather than maintaining the sash, frame, and glazing.
- Failing to undertake adequate measures to assure the protection of historic windows.

*Repair**Recommended:*

- Repairing window frames and sash by patching, splicing, consolidating or otherwise reinforcing. Such repair may also include replacement in-kind--or with compatible substitute material--of those parts that are either extensively deteriorated or are missing when there are surviving prototypes such as architrave, hood-molds, ash, sills, and interior or exterior shutters and blinds.

Not recommended:

- Replacing an entire window when repair of materials and limited replacement of deteriorated or missing parts are appropriate.

- Failing to reuse serviceable window hardware such as brass sash lifts and sash locks.
- Using substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the window or that is physically or chemically incompatible.

Replace

Recommended:

- Replacing in-kind an entire window that is too deteriorated to repair using the same sash and pane configuration and other design details. If using the same kind of material is not technically or economically feasible when replacing windows deteriorated beyond repair, then a compatible substitute material may be considered.

Not recommended:

- Removing a character-defining window that is irreparable and blocking it in, or replacing it with a new window that does not convey the same visual appearance.

5.5.7 Wood rakeboard and soffit

Rakeboard is a board fastened to the projecting gables of a roof to give them strength and to hide and protect the otherwise exposed end of the horizontal timbers. The gables of the Matthew Jones House are decorated with rakeboard designed in a simplistic manner. The wood rakeboard, fascia, and soffit are painted white (Figure 120 and Figure 121). Some areas of rakeboard show evidence of damage (Figure 122–Figure 123) or problems such as insect nest formation (Figure 125).

During the 1993 preservation work, narrow slit vents were added to the soffit to allow more ventilation within the house (Figure 124). However, due to the issues of moisture that the air conditioning system is causing, these vents might either be hindering the preservation of the wood shingles or are not adequate enough to preserve the wood shingles.

Figure 120. View of rakeboard on the southwest elevation of the porch tower (ERDC-CERL, 2012).



Figure 121. Close-up of weathered rakeboard (ERDC-CERL, 2012).



Figure 122. Split wood piece on the shed room (rear chamber) addition (ERDC-CERL, 2012).



Figure 123. Damaged rakeboard on the northeast side of the shed room (rear chamber) (ERDC-CERL, 2012).



Figure 124. Underside of the wood soffit where vents have been cut in to provide attic ventilation (ERDC-CERL, 2012).



Figure 125. Several areas under the wood soffit where insect nests have formed. Here, one area is circled in red. All should be removed (ERDC-CERL, 2012).



5.5.8 Wood, other features

There are two wood-louvered vents located on the Matthew Jones House—one on the southeast elevation (Figure 126) and one on the southwest elevation (Figure 127). These vents are located below the water table and were designed to provide ventilation to the cellar. There is also a set of wood steps providing access to the side door on the southeast elevation (Figure 128).

Figure 126. Wood-louvered vent on the southeast elevation that is blocked from the basement side (ERDC-CERL, 2012).



Figure 127. Wood-louvered cellar vent with garden house connection on the southwest elevation (ERDC-CERL, 2012).



Figure 128. Wood steps on the southeast elevation should be addressed for safety concerns (ERDC-CERL, 2012).



5.5.9 Immediate concerns for wood elements

Any work done on these elements should be sympathetic to the significant qualities of the historic property.

Any exposed end grain of wood members should not be left untreated. End-grain wood is the wood that shows the growth of rings of the tree. This area has a tendency to absorb paint, so it must be primed prior to painting; if it is not primed, the porous wood grain will soak up the paint and alter the paint color. End- grain wood is commonly found at the ends of boards, but is also found in the wood knots of boards. Unfinished wood grain is rough and needs to be sanded before paint or primer is applied. Painting the wood end grains ensures that the wood is sealed to prevent any future deterioration or decay. The wood rakeboard located on the shed room (rear chamber) addition is in need of immediate attention and repair (Figure 122 and Figure 123).

The ideal sequence for proper repainting of wood includes: cleaning of surfaces; light scraping to remove loose and scaling paint; feather of edges; priming of bare wood; and applying two finish coats. In most instances, complete removal of paint prior to repainting is unnecessary, and is not recommended. However, complete paint removal may be necessary wherever a heavy build-up of multiple layers of hardened brittle paint, surface crazing or alligatoring, or intercoat peeling or blistering have been observed.

The wood steps that provide access to the side door on the southeast elevation should be addressed for safety concerns (Figure 128). A set of new steps need to be built to code for safety purposes, including a handrail, especially if this door will be used by visitors.

There are two wood-louvered cellar vents (Figure 126 and Figure 127). Both are blocked from behind. The one on the southwest elevation currently has a garden house connection going through it (Figure 127). The garden hose is leaking water directly on the wood vent and damaging it. This area needs to be addressed to see if there is another option for placement of the garden hose and/or the leak needs to be fixed.

The wood elements are evaluated as follows:

- the wood is structurally intact and performing their intended purpose, and
- wood be stripped and painted according to the standards, and
- the deteriorated or damaged wood members be repaired according to the standards, and /or
- the wood is cleaned in order to maintain the historic appearance, and
- any repairs to the wood are made after cleaning the surface gently if necessary, and/or
- the decision to replace should be based on an extensive evaluation of all wood, replacement in substitute materials is not acceptable, and
- replaced in-kind an entire wood feature that is too deteriorated to repair, and
- standard preventive maintenance practices and building conservation methods have not been followed.

5.5.10 Maintenance / management guidelines for exterior wood

According to *The Secretary of Interior's Standards for Rehabilitation*,⁴⁹ the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the wood are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

⁴⁹ Grimmer et al., *The Secretary of the Interior's Standards for Rehabilitation*.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at www.nps.gov/tps/standards/rehabilitation/rehab/wood01.htm.

Identify, Retain, and Preserve

Recommended:

- Identifying, retaining, and preserving wood features that are important in defining the overall historic character of the building such as siding, cornices, brackets, window architraves, and doorway pediments; and their paints, finishes, and colors.

Not recommended:

- Removing or radically changing wood features which are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Removing a major portion of the historic wood from a facade instead of repairing or replacing only the deteriorated wood, then reconstructing the facade with new material in order to achieve a uniform or "improved" appearance.
- Radically changing the type of finish or its color or accent scheme so that the historic character of the exterior is diminished.
- Stripping historically painted surfaces to bare wood, then applying clear finishes or stains in order create a "natural look."
- Stripping paint or varnish to bare wood rather than repairing or reapplying a special finish, i.e., a grained finish to an exterior wood feature such as a front door.

Protect and maintain

Recommended:

- Protecting and maintaining wood features by providing proper drainage so that water is not allowed to stand on flat, horizontal surfaces or accumulate in decorative features.
- Applying chemical preservatives to wood features such as beam ends or outriggers that are exposed to decay hazards and are traditionally unpainted.
- Retaining coatings such as paint that help protect the wood from moisture and ultraviolet light. Paint removal should be considered only where there is paint surface deterioration and as part of an overall maintenance program which involves repainting or applying other appropriate protective coatings.
- Inspecting painted wood surfaces to determine whether repainting is necessary or if cleaning is all that is required. Removing damaged or deteriorated paint to the next sound layer using the gentlest method possible (handscraping and handsanding), then repainting.
- Using with care electric hot-air guns on decorative wood features and electric heat plates on flat wood surfaces when paint is so deteriorated that total removal is necessary prior to repainting.
- Using chemical strippers primarily to supplement other methods such as handscraping, handsanding and the above-recommended thermal devices. De-

tachable wooden elements such as shutters, doors, and columns may--with the proper safeguards--be chemically dip-stripped.

- Applying compatible paint coating systems following proper surface preparation. Repainting with colors that are appropriate to the historic building and district.
- Evaluating the overall condition of the wood to determine whether more than protection and maintenance are required, that is, if repairs to wood features will be necessary.

Not recommended:

- Failing to identify, evaluate, and treat the causes of wood deterioration, including faulty flashing, leaking gutters, cracks and holes in siding, deteriorated caulking in joints and seams, plant material growing too close to wood surfaces, or insect or fungus infestation.
- Using chemical preservatives such as creosote which can change the appearance of wood features unless they were used historically.
- Stripping paint or other coatings to reveal bare wood, thus exposing historically coated surfaces to the effects of accelerated weathering.
- Removing paint that is firmly adhering to, and thus, protecting wood surfaces.
- Using destructive paint removal methods such as a propane or butane torches, sandblasting, or waterblasting. These methods can irreversibly damage historic woodwork. Using thermal devices improperly so that the historic woodwork is scorched.
- Failing to neutralize the wood thoroughly after using chemicals so that new paint does not adhere.
- Allowing detachable wood features to soak too long in a caustic solution so that the wood grain is raised and the surface roughened.
- Failing to follow manufacturers' product and application instructions when repainting exterior woodwork.
- Using new colors that are inappropriate to the historic building or district. Failing to undertake adequate measures to assure the protection of wood features.

Repair

Recommended:

- Repairing wood features by patching, piecing-in, consolidating, or otherwise reinforcing the wood using recognized preservation methods. Repair may also include the limited replacement in kind--or with compatible substitute material--of those extensively deteriorated or missing parts of features where there are surviving prototypes such as brackets, molding, or sections of siding.

Not recommended:

- Replacing an entire wood feature such as a cornice or wall when repair of the wood and limited replacement of deteriorated or missing parts are appropriate.
- Using substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the wood feature or that is physically or chemically incompatible.

Replace

Recommended:

- Replacing in-kind an entire wood feature that is too deteriorated to repair--if the overall form and detailing are still evident--using the physical evidence as a model to reproduce the feature. Examples of wood features include a cornice, entablature or balustrade. If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.

Not recommended:

- Removing an entire wood feature that is unrepairable and not replacing it; or replacing it with a new feature that does not convey the same visual appearance.

5.6 Hardware

The hardware found within the Matthew Jones House is not historically significant since all of the windows and doors are replacements; however, any new hardware should be in-kind to that of the period of significance per door or window that is being highlighted as a teaching tool for the architectural-study museum.

5.6.1 Immediate concerns for exterior hardware

The exterior hardware on the Matthew Jones house is in poor condition. There are missing pieces on the front door, and a newer deadbolt lock has been installed that created cracking in the wood door (Figure 130 and Figure 131). Also, the hardware on the recommended replacement door on the southeast elevation should be in-kind to the 1893 period. The hinges on the cellar doors should be repaired and reused when the cellar doors are replaced. If the hinges are too deteriorated, then they should be replaced in-kind.

Restore hardware where possible to preserve the integrity of the house. If any work is done on the hardware, it should be sympathetic to the significant qualities of the historic property (Figure 132).

The hardware elements (Figure 129–Figure 131) are evaluated as follows:

- the hardware is rusting and will need to be cleaned, and
- the hardware shows signs of daily use and wear as the finishes are wearing, and

- the hardware needs to be maintained on a yearly basis in order to insure that it will continue to function properly, and
- rusty hinges and door hardware are cleaned.

Figure 129. Door knob with missing keyhole on main front door on the southwest elevation (ERDC-CERL, 2012).



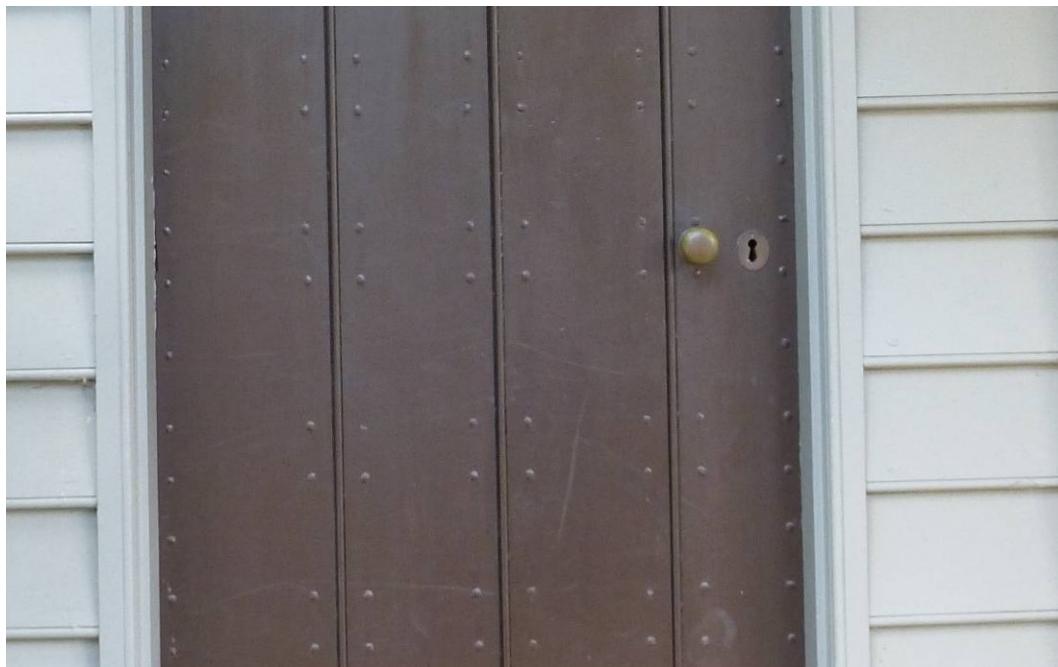
Figure 130. Newer lock added to the front door on the southwest elevation; notice the cracking wood from insertion of the hardware (ERDC-CERL, 2012).



Figure 131. Door hinge on wood cellar door. Whenever the doors are replaced, the hardware should either be repaired or replaced in-kind (ERDC-CERL, 2012).



Figure 132. A good example of appropriate door hardware for the side door on the southeast elevation of the Matthew Jones House (photo taken at Colonial Williamsburg, Virginia; ERDC-CERL, 2012).



5.7 Interior brick

5.7.1 Brick chimneys

The interior of the northwest chimney (the hall) was laid in a regular English bond with random glazing (Figure 133). The original fireplace measured 7'-3" across and 3'-4" deep. The scale of the fireplace suggests that this room was used as the hall. The original fireplace had a large wood lintel that provided for an opening much larger than the present. The fireplace opening was reduced in size in Period II to give a domestic scale to the space (Figure 134 and Figure 135). The southeast fireplace, although placed in a chimney the same size as the western counterpart, measured 4'-7 ½" wide (Figure 140). The inside wall of this chimney was more crudely laid. There is an appearance of English bond to the pattern, but the heavy use of bats and headers and multiple consecutive rows of header courses indicate that this brick is of inferior quality to that in the hall on the west side of the house. The smaller size of the fireplace in the east room assures that the east end of the house originally served as the principal chamber. The chimneys originally protruded 4 ½" beyond the inside face of the two end joints. In the remodeling of the house in Period II, the new walls were set flush with the chimney face.⁵⁰ These two fireplaces were lined with new brick during the Period III renovations (Figure 137).

A third fireplace was constructed with the addition of the shed on the rear of the house in Period II (Figure 141). It is supported by corbelled bricks from the corner of the foundation walls immediately below the floor. White shell mortar and glazed bricks were used in the initial construction of this fireplace. The small triangles between the outside edges of the chimney and the brick walls were later infilled with salmon brick and lime mortar (without shell). The original opening was 2'-2" wide and 2'-10" tall, but it was blocked when a stove was added to the room in 1893 (Figure 142).⁵¹

When the second floor was added, two more fireplaces were constructed in the two chambers. The fireplace (on the second-floor chambers' northwest wall) was cut into the chimney ca. 1730 (Figure 139). The fireplace on the second floor on the southeast wall was cut into the original chimney in Pe-

⁵⁰ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 42.

⁵¹ *ibid.*, 51.

riod II. The concrete has been determined to be added in Period III, 1893 (Figure 143).

Figure 133. Hall fireplace on the northwest wall (ERDC-CERL, 2012).



Figure 134. Joint with brick wall showing the brick infill used to make the original large hall fireplace smaller. Also note the deterioration of the brick in the west fireplace (ERDC-CERL, 2012).



Figure 135. Feature #19 points out fireplace opening for Period I; #20 is original masonry jamb; #21-is fireplace opening in Period II; #22-is fireplace opening in Period III; and #26 shows pockets for Period II mantel blocking (ERDC-CERL, 2012).



Figure 136. Large crack in brickwork around hall fireplace (ERDC-CERL, 2012).



Figure 137. Brick infill when fireplace was converted to a stove, northwest hall fireplace (ERDC-CERL, 2012).



Figure 138. A stove thimble was added shortly after the 1893 remodeling to the northwest chimney (ERDC-CERL, 2012).



Figure 139. This fireplace (on the second-floor chambers northwest wall) was cut into the chimney ca. 1730 (ERDC-CERL, 2012).



Figure 140. Brick infill when the fireplace jambs were made narrower in Period II to fireplace on the southeast wall (ERDC-CERL, 2012).



Figure 141. A third fireplace and chimney were constructed when the shed room (rear chamber) was added in Period II (ERDC-CERL, 2012).



Figure 142. Stove thimble that was added in 1893 in the shed room (rear chamber) addition (ERDC-CERL, 2012).



Figure 143. Fireplace on the second floor on the southeast wall. The fireplace was cut into the original chimney in Period II. The concrete was added in 1893 (Period III) (ERDC-CERL, 2012).

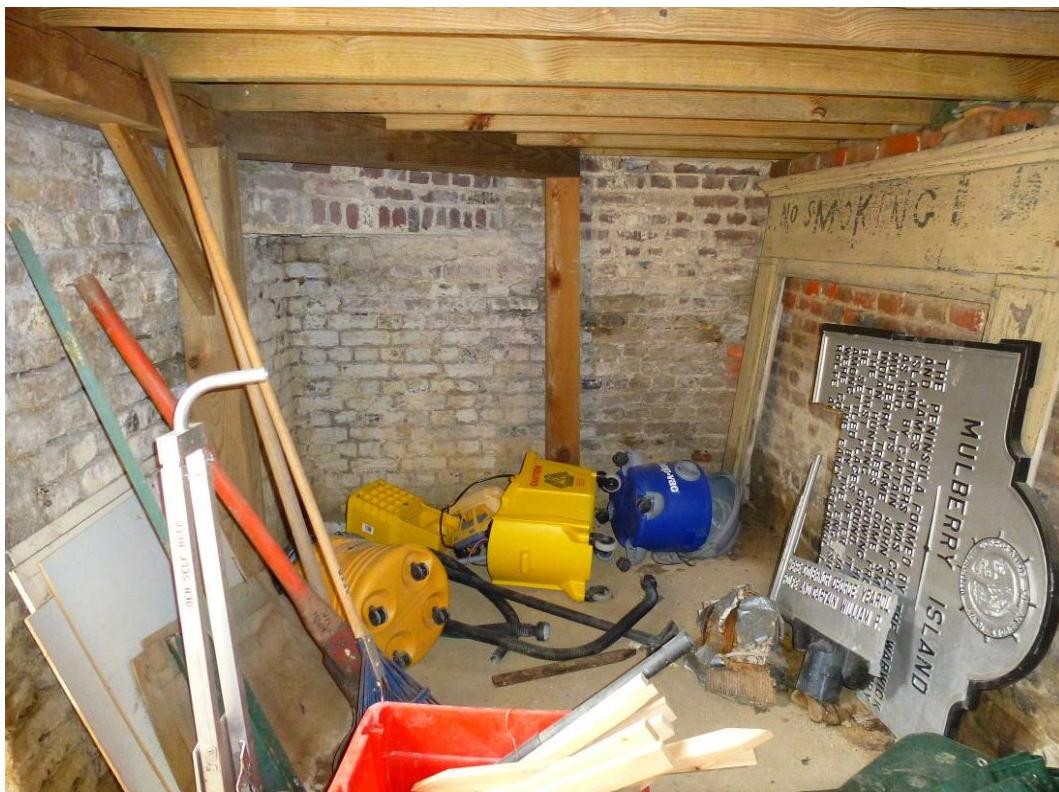


5.7.2 Brick walls

The interior brick walls date to Period II and are laid in English bond, except for the rear wall that uses Flemish bond brickwork. The original wall between the shed room (rear chamber) and main block was partially dismantled during Period II renovations.⁵²

The jointing used in the brick walls is also important. Relatively white mortar with moderate chunks of shell and lime was used on the exterior during this phase, along with a grapevine joint. However, the interior mortar is more of a buff color, largely due to less lime in the recipe. This was a common practice to reduce the cost of building materials. Additionally the interior was crudely struck with an undercut joint, executed freehand. The bond is much more irregular on the interior and tends towards English rather than Flemish bond. Within the tower, all four walls are treated in this manner.⁵³

Figure 144. Looking at the southeast wall of the cellar and the corbelled base for the shed room (rear chamber) chimney (ERDC-CERL, 2012).



⁵² Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 51.

⁵³ *ibid.*, 52.

Figure 145. Brick foundation walls for the shed room (rear chamber) addition (ERDC-CERL, 2012).

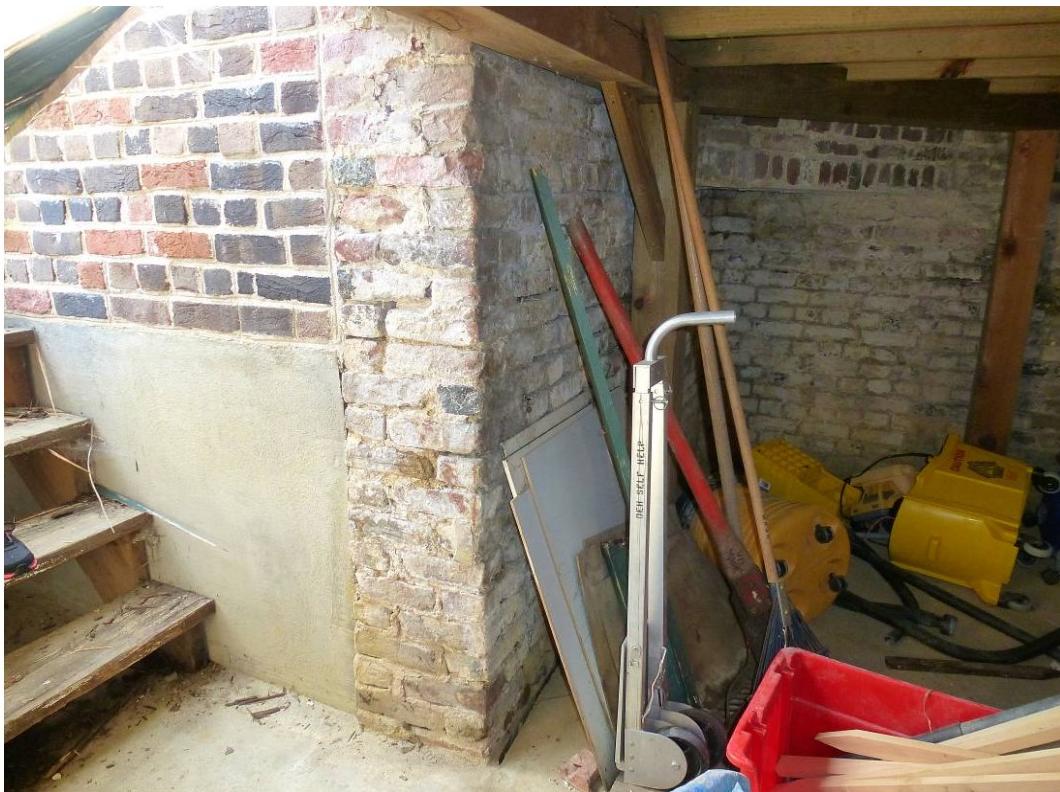


Figure 146. Wet bricks in cellar caused by standing water on cellar floor (ERDC-CERL, 2012).



Figure 147. Brick wall in porch tower was roughly laid in Flemish bond and coarsely troweled, since the wall was intended to be plastered. (ERDC-CERL, 2012).

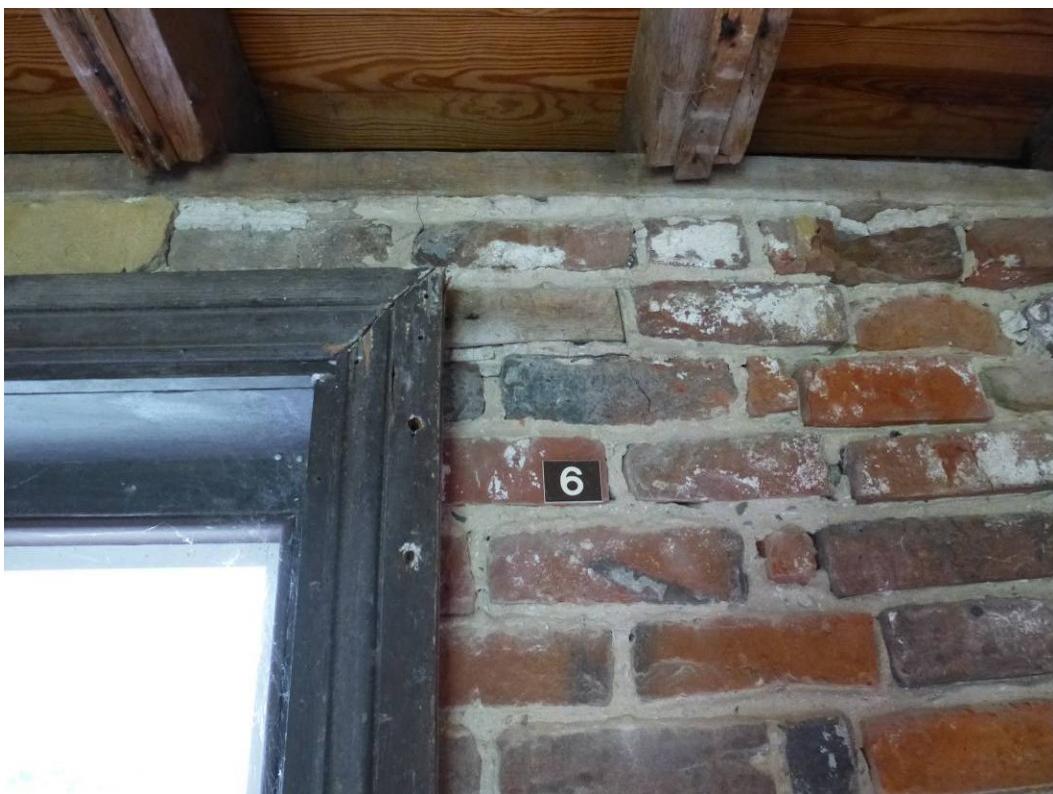


Figure 148. Northeast brick wall of porch tower with failing plaster work (ERDC-CERL, 2012).

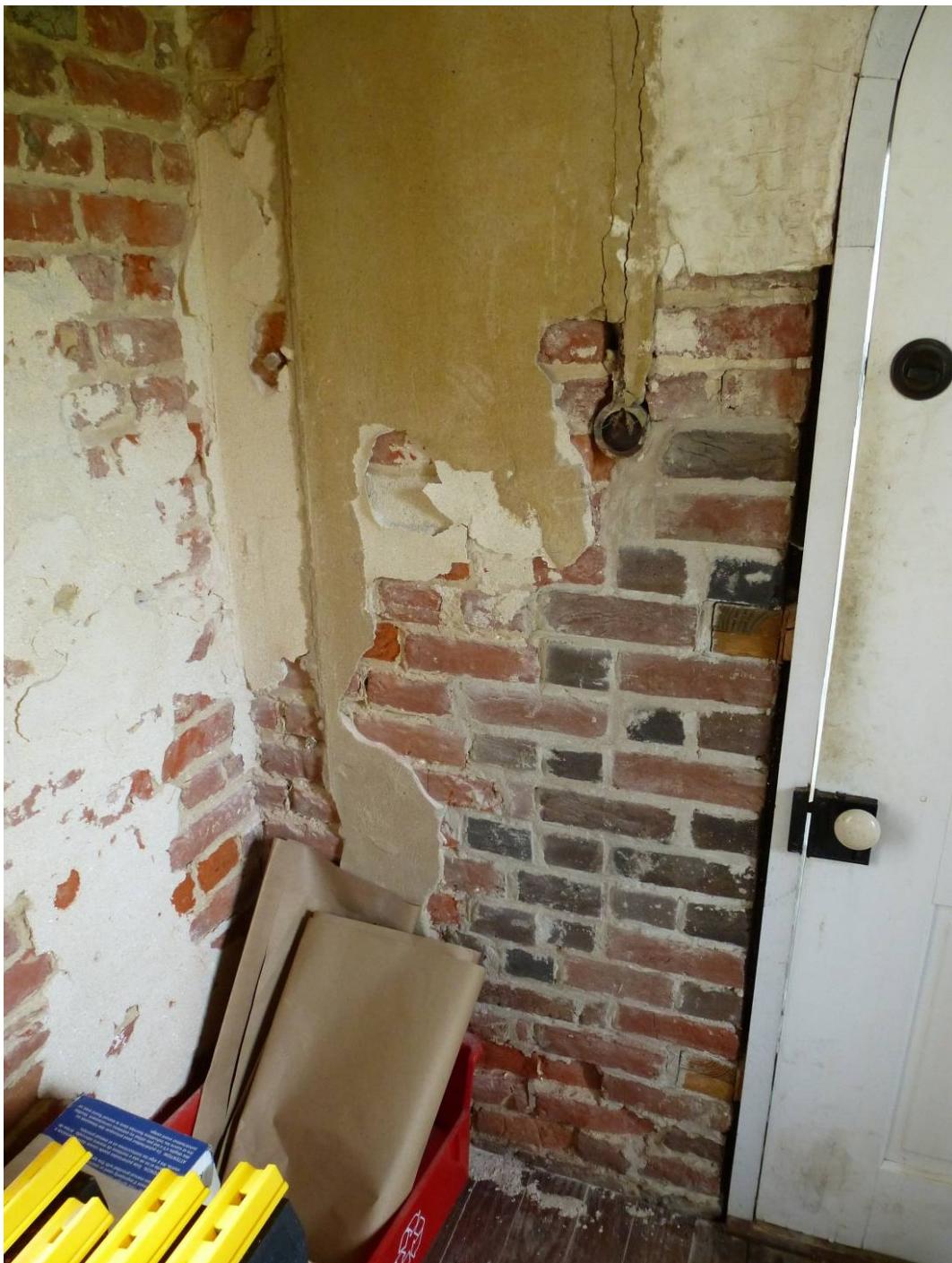


Figure 149. Brick “dust” from deteriorating bricks (ERDC-CERL, 2012).

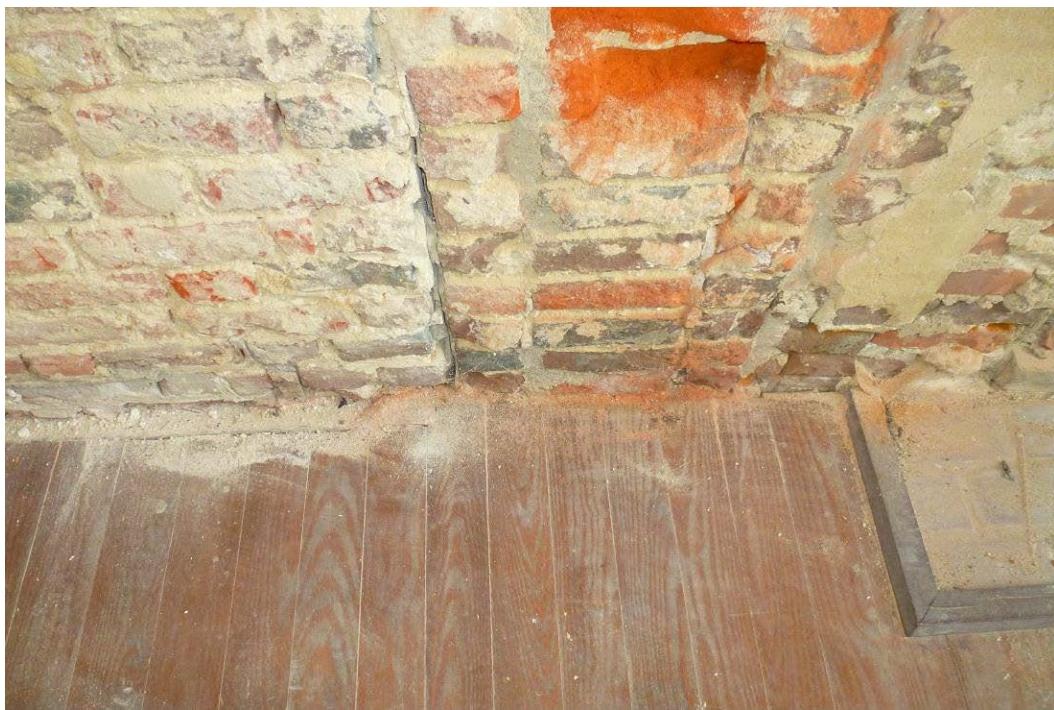


Figure 150. Holes in the brickwork around the perimeter of the hall were for chair board blocking ; when the frame walls were replaced with brick ca. 1730, wood blocks were installed to carry a chair board (ERDC-CERL, 2012).

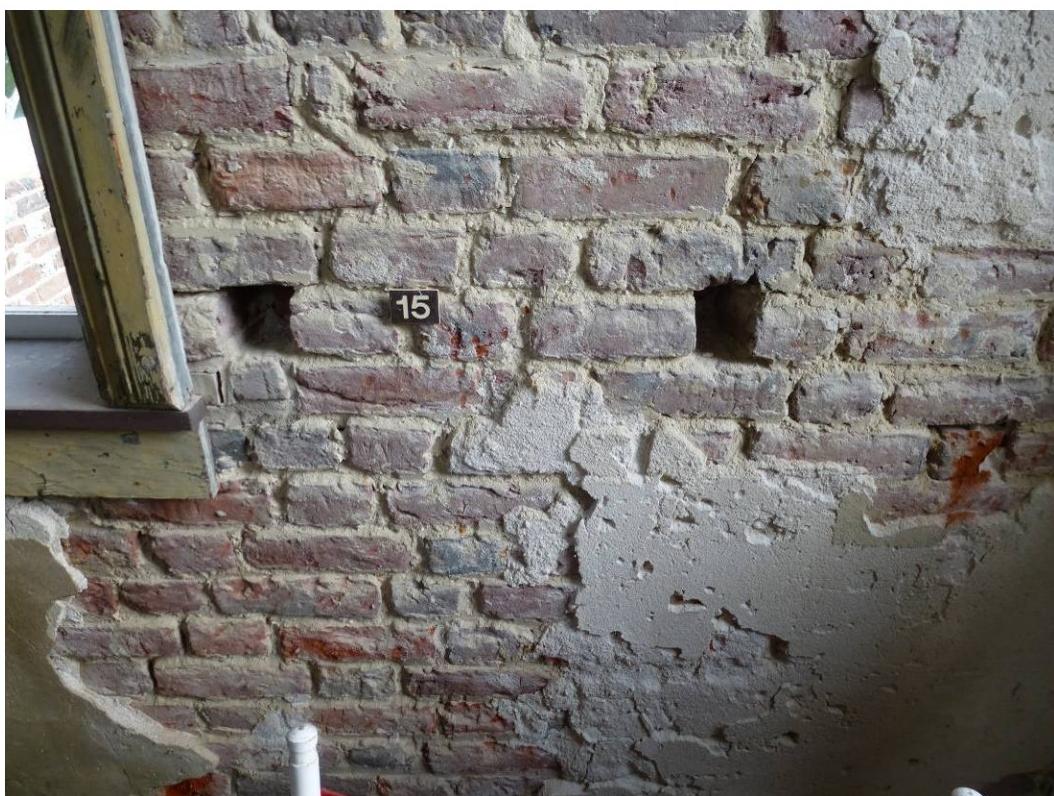


Figure 151. Structural crack above the fireplace on the northwest wall circled in red
(ERDC-CERL, 2012).



Figure 152. Close-up of the structural crack above the fireplace on the northwest wall
(ERDC-CERL, 2012).



Figure 153. The knee-wall studs on the northwest wall caused vertical cracks not only in the plaster but also in the brick wall (ERDC-CERL, 2012).

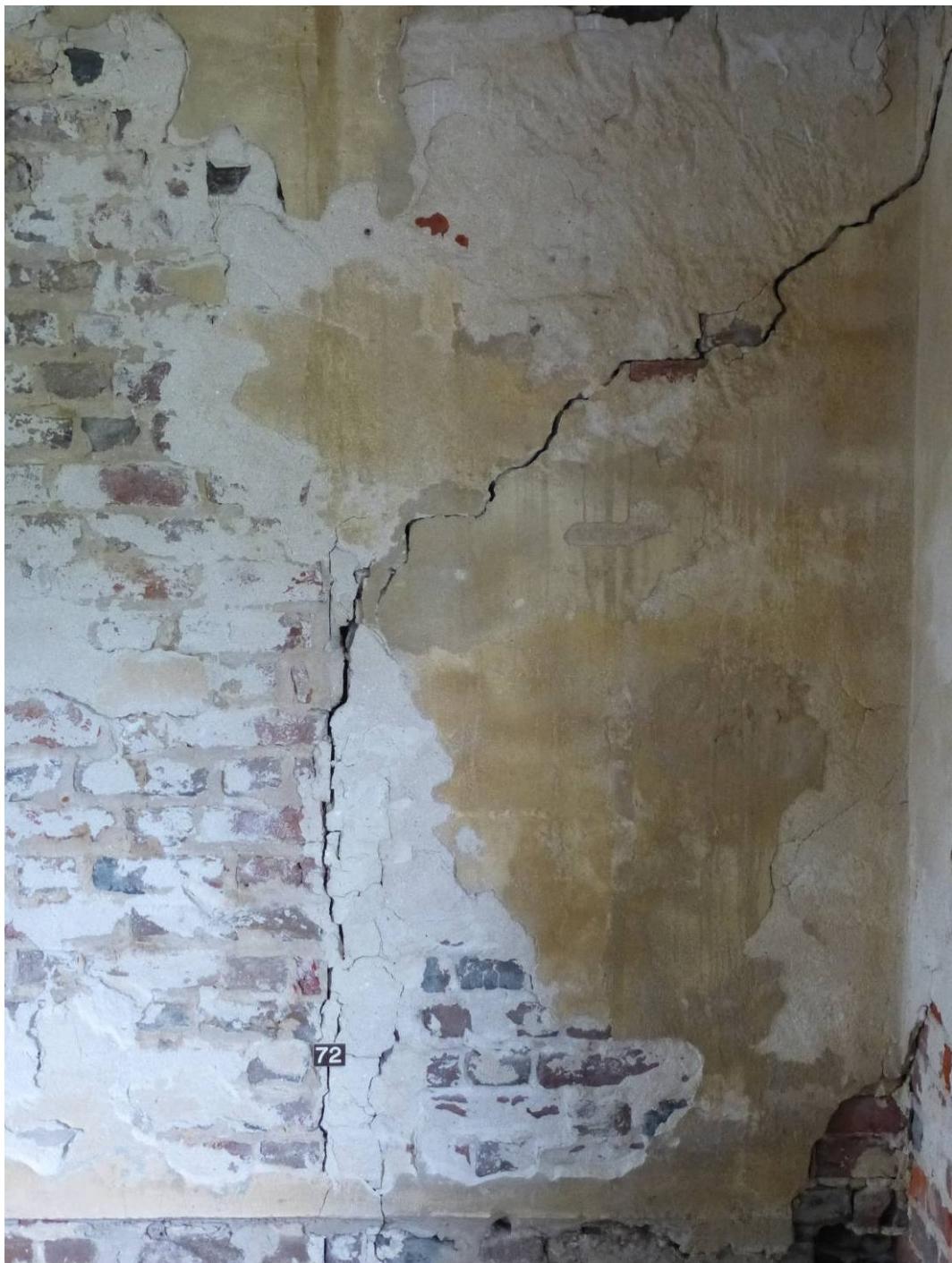


Figure 154. Second-floor southeast wall of porch tower is showing signs of cracking in both plaster lath and brick exterior wall (ERDC-CERL, 2012).



5.7.3 Immediate concerns for masonry

Historic brick masonry is a durable product whose primary source of deterioration is exposure to moisture and water. Historic bricks are generally softer than their modern counterparts, and the original mortars used with

them were more flexible than those used currently. Original mortars had a high lime content, which allowed the mortar to absorb cyclical movement of the structure, in particular during the critical freeze-thaw cycle.

The house is kept too cold as compared to the hot, humid southern summers. The moist, cold air from within the house touches the exposed interior side of the brick while the exterior side of the brick is hot, creating moisture and condensation within the bricks. The bricks are ultimately crumbling to pieces. Evidence of this is seen on the interior with the buildup of “brick dust” at the base of each wall (Figure 149).

The major concern with the brick and mortar on the Matthew Jones House could be directly tied to the improper use and the efficiency of the current HVAC system. There is no insulation of the inside of the exterior brick wall, historically or now. If the house is to be kept as an architectural-study museum, the correct HVAC system is required to control the amount of moisture allowed in the building and on the architectural elements.

There are cracks in most of the masonry walls. Most of them are minor and are a common wall crack probably caused by thermal or moisture expansion. However, two are of concern. One is a large crack that runs vertically along the northwest wall (Figure 153). The other crack is located above the second-floor chamber over the hall (Figure 151 and Figure 152). Both of these cracks have formed gaps in the exterior wall where one can see daylight through them, ultimately allowing the elements from outside into the building. Most cracks are attributed to the expansion of the wood framing on the interior, but the freeze-thaw cycle also contributes to the growth of cracks.

The spalling, dusting, or flaking of brick masonry units may be due to either mechanical or chemical damage. Mechanical damage is caused by moisture entering the brick and freezing, resulting in spalling of the bricks' outer layers. Spalling may continue or may stop of its own accord after the outer layers that trapped the interior moisture have broken off.⁵⁴

Chemical damage is due to the leaching of chemicals from the ground into the brick, resulting in internal deterioration. External signs of such deterioration are a dusting or flaking of the brick. Very little can be done to cor-

⁵⁴ Excerpt from The Old House Web. “General Masonry Inspection.”

rect existing mechanical and chemical damage, except to replace the brick. Mechanical deterioration can be slowed or stopped by directing water away from the masonry surface and by repointing mortar joints to slow water entry into the wall. Surface sealants (damp-proofing coatings) are rarely effective and may hasten deterioration by trapping moisture or soluble salts that inevitably penetrate the wall and in turn cause further spalling. Chemical deterioration can be slowed or stopped by adding a damp-proof course (or injecting a damp-proofing material) into the brick wall just above the ground line. Consult a masonry specialist for this type of repair.⁵⁵

The northwest and southeast chimneys are original features to the house. Much about the changes to the house over the past 293 years can be read from each chimney's interior surface. These two features need to be preserved and maintained on a regular basis. The interior of the brick chimneys are in poor condition. The inside of the bricks are showing severe signs of deterioration. Similar to the interior brick walls, the chimneys are crumbling and "brick dust" is collecting in piles at the base of the chimneys. Since the Matthew Jones House is being used as an architectural-study museum, replacement of these bricks is not recommended, but it is a concern to the CRM staff on how to maintain these already-deteriorated bricks and to prevent complete loss of these features. Some of the procedures that would be used to stop the deterioration of the brick (e.g., sealants) are not recommended by *Secretary of Interior Standards for Rehabilitation*.⁵⁶

The CRM staff needs to immediately hire a professional brick mason knowledgeable in local brick structures. The mason should perform a thorough investigation of all brick in the Matthew Jones House to determine which bricks are too far gone and to determine the type of deterioration that is attacking the bricks (i.e., mechanical deterioration or chemical deterioration).

Also, the brick walls in the cellar are becoming wet from either the condensation produced from the HVAC that is housed in the cellar area or the groundwater that is penetrating the cellar walls (Figure 146).

⁵⁵ Excerpt from The Old House Web. "General Masonry Inspection."

⁵⁶ Grimmer et al., *The Secretary of the Interior's Standards for Rehabilitation*.

The northeast cellar wall has been restabilized with the 1993 preservation efforts. The reason it needed to be replaced was in part due to water entering on an upper level, freezing and expanding the brick. Extra attention should be paid to this wall, and it should be monitored on a regular basis so that the wall does not begin to bulge out again.

Holes in the brickwork around the perimeter of the hall are an indication of where wood blocks were installed to carrying a chair board. Do not fill these holes (Figure 150).

Overall care should be taken to protect the original brick and mortar. Where brick masonry is extremely deteriorated, replacement in-kind must occur. Care must be used to select sound and matching bricks for all repairs. Specialty brick is available from a variety of sources, and efforts to identify matching brick units should be required.

The brick and mortar (Figure 133–Figure 154) are evaluated as follows:

- the brick and mortar is not structurally and architecturally intact, and
- poor patch work over parts of the brick and mortar will need to be replaced, and
- maintenance of the brick and mortar is needed for it to continue to function as it was designed, and
- all exposed masonry should be inspected for cracking, spalling, bowing (bulges vertically), sweeping (bulges horizontally), leaning, and mortar deterioration, and
- damaged surfaces should be cleaned and repaired as per preservation standards laid out in this manual, and
- repairs are needed as necessary with materials that are like in appearance and mechanical properties, and/or
- standard preventive maintenance practices and building conservation methods have not been followed, and/or

- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years, and/or
- poor repair job which should be cleaned and properly executed.

5.7.4 Maintenance / management guidelines for masonry

According to *The Secretary of Interior's Standards for Rehabilitation*,⁵⁷ the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when necessary.

The following recommendations for care of historic brick are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

Following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at www.nps.gov/tps/standards/rehabilitation/rehab/masonry01.htm.

Identify, Retain, and Preserve

Recommended

- Identifying, retaining, and preserving masonry features that are important in defining the overall historic character of the building such as walls, brackets, railings, cornices, window architraves, door pediments, steps, and columns; and details such as tooling and bonding patterns, coatings, and color.

Not Recommended

- Removing or radically changing masonry features that are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Replacing or rebuilding a major portion of exterior masonry walls that could be repaired so that, as a result, the building is no longer historic and is essentially new construction.
- Applying paint or other coatings such as stucco to masonry that has been historically unpainted or uncoated to create a new appearance.

⁵⁷ Grimmer et al., *The Secretary of the Interior's Standards for Rehabilitation*.

Protect and Maintain

Recommended

- Protecting and maintaining masonry by providing proper drainage so that water does not stand on flat, horizontal surfaces or accumulate in curved decorative features.
- Cleaning masonry only when necessary to halt deterioration or remove heavy soiling.
- Carrying out masonry surface cleaning tests after it has been determined that such cleaning is appropriate. Tests should be observed over a sufficient period so that both the immediate and the long range effects are known to enable selection of the gentlest method possible.
- Cleaning masonry surfaces with the gentlest method possible, such as low-pressure water and detergents, using natural bristle brushes.
- Evaluating the overall condition of the masonry to determine whether more than protection and maintenance are required, that is, if repairs to the masonry features will be necessary.

Not Recommended

- Failing to evaluate and treat the various causes of mortar joint deterioration such as leaking roofs or gutters, differential settlement of the building, capillary action, or extreme weather exposure.
- Cleaning masonry surfaces when they are not heavily soiled to create a new appearance, thus needlessly introducing chemicals or moisture into historic materials.
- Cleaning masonry surfaces without testing or without sufficient time for the testing results to be of value.
- Sandblasting brick or stone surfaces using dry or wet grit or other abrasives. These methods of cleaning permanently erode the surface of the material and accelerate deterioration.
- Using a cleaning method that involves water or liquid chemical solutions when there is any possibility of freezing temperatures.
- Cleaning with chemical products that will damage masonry, such as using acid on limestone or marble, or leaving chemicals on masonry surfaces.
- Applying high pressure water cleaning methods that will damage historic masonry and the mortar joints.
- Failing to undertake adequate measures to assure the protection of masonry features.

Repair

Recommended

- Repairing masonry walls and other masonry features by repointing the mortar joints where there is evidence of deterioration such as disintegrating mortar, cracks in mortar joints, loose bricks, damp walls, or damaged plasterwork.
- Removing deteriorated mortar by carefully hand raking the joints to avoid damaging the masonry.

- Duplicating old mortar in strength, composition, color, and texture.
- Duplicating old mortar joints in width and in joint profile.
- Repairing masonry features by patching, piecing-in, or consolidating the masonry using recognized preservation methods. Repair may also include the limited replacement in-kind--or with compatible substitute material--of those extensively deteriorated or missing parts of masonry features when there are surviving prototypes such as terra cotta brackets or stone balusters.
- Applying new or non-historic surface treatments such as water-repellent coatings to masonry only after repointing and only if masonry repairs have failed to arrest water penetration problems.

Not Recommended

- Removing nondeteriorated mortar from sound joints, and then repointing the entire building to achieve a uniform appearance.
- Using electric saws and hammers rather than hand tools to remove deteriorated mortar from joints prior to repointing.
- Repointing with mortar of high Portland cement content (unless it is the content of the historic mortar). This can often create a bond that is stronger than the historic material and can cause damage as a result of the differing coefficient of expansion and the differing porosity of the material and the mortar.
- Repointing with a synthetic caulking compound.
- Using a "scrub" coating technique to repoint instead of traditional repointing methods.
- Changing the width or joint profile when repointing.
- Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the masonry feature or that is physically or chemically incompatible.
- Applying waterproof, water repellent, or non-historic coatings such as stucco to masonry as a substitute for repointing and masonry repairs. Coatings are frequently unnecessary, expensive, and may change the appearance of historic masonry as well as accelerate its deterioration.

Replace

Recommended

- Replacing in-kind an entire masonry feature that is too deteriorated to repair--if the overall form and detailing are still evident--using the physical evidence as a model to reproduce the feature. Examples can include large sections of a wall, a cornice, balustrade, column, or stairway. If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.

Not Recommended

- Removing a masonry feature that is unrepairable and not replacing it; or replacing it with a new feature that does not convey the same visual appearance.

5.8 Structural system

5.8.1 Wood structural system

The following is a list of significant wood structural elements that are intact within the Matthew Jones House and are part of the architectural features that are highlighted for the architectural-study museum.⁵⁸

Beams and column supports: Newer wood structural members such as beams and columns have been added for additional support in the cellar level (Figure 155).

Ceiling joists in first-floor Tower: Some of the last remaining eighteenth-century framing in the house, these joists were set in place during the construction of the porch tower in Period II and retained when the house was gutted and remodeled in Period III. These are made of oak and are hewn and pit sawn (Figure 156).

Front plate wall in Hall: This is one of four main timbers and two secondary members to survive from the Period I house (Figure 157).

End joist in Hall: This joist once extended across the width of the house. When the fireplace was installed on the second floor in Period II, it was cut in two. The bottom edge of the beam has been molded with cyma, illustrating the superiority of the hall over the chamber (Figure 158).

Wood plate: The absence of any joints on the underside of the plate from the right side of this window to the intermediate post is an indication that a five-foot wide window was originally situated here, immediately below the plate. The width of the window suggests that it was a casement, with small square or diamond panes held together with lead “cames” (Figure 159).

Rear wall plate in Hall: Another surviving original timber. Though its bottom edge was hacked back in the late nineteenth century to accept plaster and to keep it from projecting into the room, it was originally planned on the interior face, and its bottom edge was decorated with a chamfer and lamb’s-tongue stops (Figure 160).

⁵⁸ Woodward et al. “The Matthew Jones House at Fort Eustis, Virginia. A Case Study of Historic Preservation.”

End joist in Dining Room: This joist once extended across the width of the house. When the fireplace was installed on the second floor in Period II, it was cut in two. This joist is chamfered on its bottom edge (Figure 161).

Rear plate wall in Dining Room: An original framing member, it was hand-planed on the interior face, and its bottom edge was decorated with a chamfer and lamb's-tongue stops (Figure 162).

Rear plate wall in Shed Room (rear chamber): With its “scarf” joint, this element is original to the construction of the shed ca. 1730 (Figure 163).

Floor joists in Shed Room (rear chamber): Many of ca. 1730 floor joists survive in the shed.

Joist end in Shed Room (rear chamber): The only original joist whose end has not been removed. The rounded bottom suggests it was in combination with a “tilted false plate” (Figure 164).

Rear wall plate in Main Block: The rear face of this plate exhibits the joints for framing from Periods I and II (Figure 165).

Ceiling joist, rafters, collars and shingle lath in second-floor Passage: When the house was raised to two stories in 1893, the present circular-sawn joists and rafters were installed (Figure 166).

Ceiling joists in second-floor Tower Room: Some of the last remaining eighteenth-century framing in the house, these joists were set in place during the construction of the porch tower ca. 1730 and retained when the house was gutted and remodeled in Period III. These are made of oak and are hewn and pit sawn (Figure 167).

Original rafters in second-floor Tower Room: The two end rafter pairs date to the construction of the tower ca. 1730. They are hewn and pit sawn and have been joined at the ridge by an open mortise and tenon joint. The joint was then pegged (Figure 168).

Figure 155. Newer wood support members in the cellar (ERDC-CERL, 2012).



Figure 156. Ceiling joists in the Tower are some of the last remaining eighteenth-century framing in the house (ERDC-CERL, 2012).



Figure 157. Architectural study feature #28-points out the front wall plate on the southwest wall that is one of the four main timbers to survive from Period I. Feature #29 highlights the peg hole representing the location of one of the four main posts along the front wall. The peg secured the tenon of a post that was exposed in the room. Feature #31 highlights ghost joists. The original joists were removed in 1893. Feature #39 highlights steel supports added during the 1993 preservation efforts (ERDC-CERL, 2012).



Figure 158. End joist in hall (ERDC-CERL, 2012).



Figure 159. Wood plate (#30) indicates that the original window opening would have been 5 feet wide for casement window (ERDC-CERL, 2012).

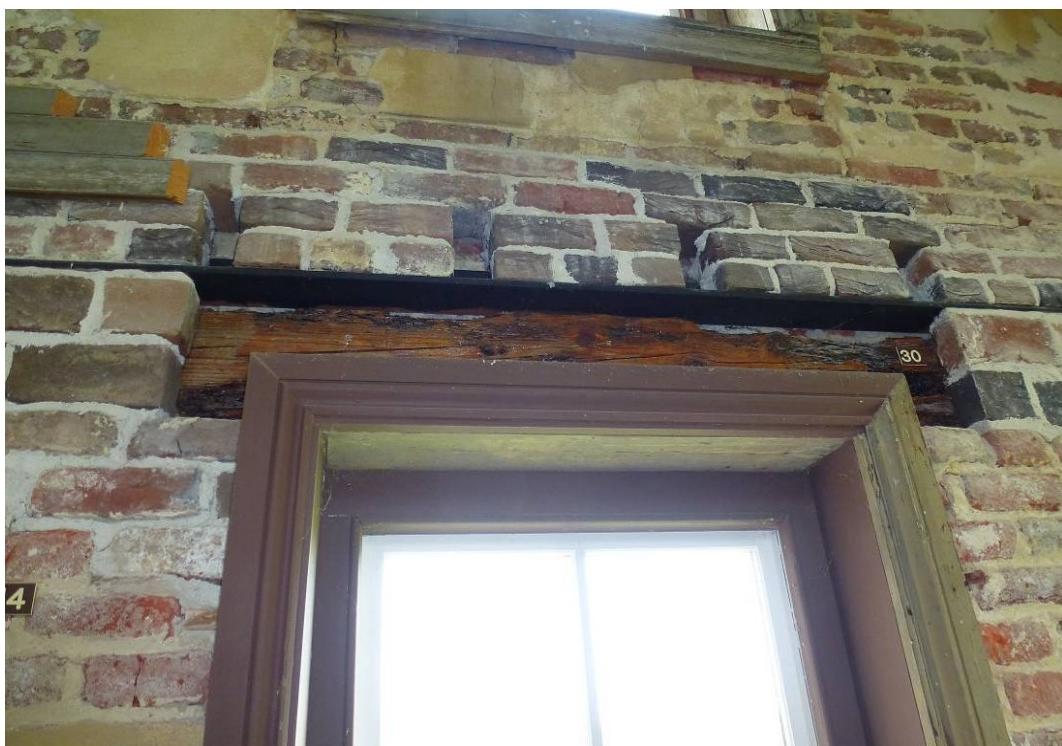


Figure 160. The rear wall plate (#34) is another surviving original timber. It was originally hand planed on the interior face, and its bottom edge was decorated with a chamfer and lamb's-tongue stops (ERDC-CERL, 2012).



Figure 161. End joist in dining room indicated by #49 (ERDC-CERL, 2012).



Figure 162. Rear wall plate in dining room indicated by #50 (ERDC-CERL, 2012).



Figure 163. The rear wall plate for the shed (#58) has a “scarf” joint and is original to the construction of the shed ca. 1730. The rafters are all late nineteenth century and later replacements (ERDC-CERL, 2012).



Figure 164. The only original end joint that has not been removed (#65) is located on the northeast wall, visible in the shed room (rear chamber) addition (ERDC-CERL, 2012).



Figure 165. Rear wall plate (main block) exhibits the joints for framing from Period I and Period II (ERDC-CERL, 2012).



Figure 166. Looking up at the underside of the ceiling in the second-floor passage—ceiling joists, rafters, collars, and shingle lath (ERDC-CERL, 2012).



Figure 167. Some of the last remaining eighteenth-century framing in the house. These joists were set in place during the construction of the porch tower ca. 1730. They are made of oak and are hewn and pit sawn (ERDC-CERL, 2012).



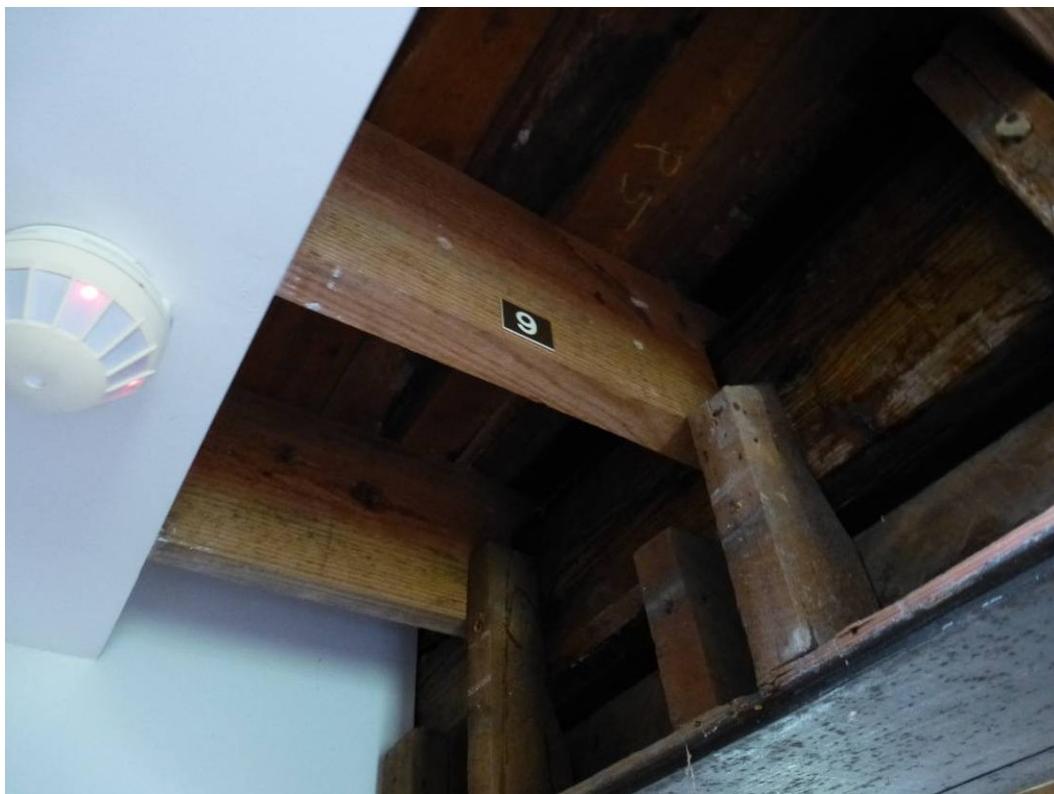
Figure 168. The two end rafter pairs date to the construction of the tower ca. 1730. They are hewn and pit sawn and have been joined at the ridge by an open mortise and tenon joint. The joint was then pegged (ERDC-CERL, 2012).



Figure 169. The knee-wall stud is a Period I feature, left in place during both the ca. 1730 and 1893 renovations. The brick work to the right of the stud was added when the building was raised fully to two stories in Period II. (ERDC-CERL, 2012).



Figure 170. Most of the original ceiling joists in the main block of the house were replaced in Period III and then replaced in the preservation effort in 1993 due to decay (ERDC-CERL, 2012).



5.8.2 Immediate concerns for wood structural members

The wood structural members of the Matthew Jones House date from different periods. The wood framing members are associated with the qualities for which the Matthew Jones House was designated a significant property. The wood members contribute to the historic appearance of the house and help tell the story of the house by being architecturally distinctive with a high level of historic integrity. Therefore, every effort should be made to preserve them.

Most of the wood structural members were evaluated in the 1993 preservation efforts. Many of the concerns brought to light during a structural analysis conducted at that time have since been addressed and fixed. However, it is important to note that a routine examination of these members be performed to maintain not only structural stability but appearance of each member should be maintained since the Matthew Jones House is being used as an architectural-study museum.

The wood structural members (Figure 155–Figure 170) are evaluated as follows:

- the wood members are intact and in good condition, and
- cleaning and repair of the wood will result only from professional recommendation, and
- any repair or maintenance of the wood is to be executed by a qualified professional.

5.8.3 Maintenance / management guidelines for wood structural system

According to *The Secretary of Interior's Standards for Rehabilitation*,⁵⁹ the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the wood structural system are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at www.nps.gov/tps/standards/rehabilitation/rehab/structure01.htm.

Identify, Retain, and Preserve

Recommended

- Identifying, retaining, and preserving structural systems--and individual features of systems--that are important in defining the overall historic character of the building, such as post and beam systems, trusses, summer beams, vigas, cast iron columns, above-grade stone foundation walls, or load-bearing brick or stone walls.

Not Recommended

- Altering visible features of historic structural systems which are important in defining the overall historic character of the building so that, as a result, the character is diminished.

⁵⁹ Grimmer et al., *The Secretary of the Interior's Standards for Rehabilitation*.

- Overloading the existing structural system; or installing equipment or mechanical systems which could damage the structure.
- Replacing a load-bearing masonry wall that could be augmented and retained.
- Leaving known structural problems untreated such as deflection of beams, cracking and bowing of walls, or racking of structural members.
- Utilizing treatments or products that accelerate the deterioration of structural material such as introducing urea-formaldehyde foam insulation into frame walls.

Stabilize

Recommended

- Stabilizing deteriorated or damaged structural systems as a preliminary measure, when necessary, prior to undertaking appropriate preservation work.

Not Recommended

- Failing to stabilize a deteriorated or damaged structural system until additional work is undertaken, thus allowing further damage to occur to the historic building.

Protect and Maintain

Recommended

- Protecting and maintaining the structural system by cleaning the roof gutters and downspouts; replacing roof flashing; keeping masonry, wood, and architectural metals in a sound condition; and ensuring that structural members are free from insect infestation.
- Examining and evaluating the existing condition of the structural system and its individual features using non-destructive techniques such as X-ray photography.

Not Recommended

- Failing to provide proper building maintenance so that deterioration of the structural system results. Causes of deterioration include subsurface ground movement, vegetation growing too close to foundation walls, improper grading, fungal rot, and poor interior ventilation that results in condensation.
- Utilizing destructive probing techniques that will damage or destroy structural material.

Repair

Recommended

- Repairing the structural system by augmenting or upgrading individual parts or features using recognized preservation methods. For example, weakened structural members such as floor framing can be paired with a new member, braced, or otherwise supplemented and reinforced.

Not Recommended

- Upgrading the building structurally in a manner that diminishes the historic character of the exterior, such as installing strapping channels or removing a decorative cornice; or damages interior features or spaces.

- Replacing a structural member or other feature of the structural system when it could be augmented and retained.

Replace

Recommended

- Replacing in-kind those visible portions or features of the structural system that are either extensively deteriorated or missing when there are surviving prototypes such as cast iron columns and sections of loadbearing walls. The new work should match the old in materials, design, color, and texture; and be unobtrusively dated to guide future research and treatment.
- Considering the use of substitute material for unexposed structural replacements, such as roof rafters or trusses. Substitute material should, at a minimum, have equal load-bearing capabilities, and be unobtrusively dated to guide future research and treatment.

Not Recommended

- Replacing an entire visible feature of the structural system when limited replacement of deteriorated and missing portions is appropriate.
- Using material for a portion of an exposed structural feature that does not match the historic feature; or failing to properly document the new work.
- Using substitute material that does not equal the load-bearing capabilities of the historic material or design or is otherwise physically or chemically incompatible.

5.9 Interior features and finishes

An interior floor plan, the arrangement and sequence of spaces, and built-in features and applied finishes are individually and collectively important in defining the historic character of the building.

Their identification, retention, protection, and repair should be given prime consideration in every rehabilitation project. In evaluating historic interiors prior to rehabilitation, it should be kept in mind that interiors are comprised of a series of primary and secondary spaces. Care should be taken to retain the essential proportions of primary interior spaces and not to damage, obscure, or destroy distinctive features and finishes.⁶⁰

⁶⁰ Excerpt from National Park Service. "Building Interior: Spaces Features, and Finishes." In *Secretary of the Interior's Standards for Rehabilitation*. (Washington, DC: US Department of the Interior, National Park Service, Technical Preservation Services, n.d.) Available online at: <http://www.nps.gov/tps/standards/rehabilitation/rehab/spaces01.htm>.

5.9.1 Wood fireplace mantels

Matching wood mantels were used on the first-floor renovation in the Period III renovations. Plain wood mantels with flat pilasters and a wide, undecorated frieze were chosen for these two spaces (Figure 171 and Figure 172).⁶¹

5.9.2 Immediate concerns for wood mantels

The fireplace mantels of the Matthew Jones House contribute to the historic significance and appearance of the house. The hall, dining room, and second-floor chamber over the dining room have had the mantels removed. The only fireplace mantel intact and in place is in the second-floor chamber over the hall (Figure 173).

During field work for this report, it was noted that two of the wood mantels were being stored in the cellar. These two wood fireplace mantels are either stored on the cellar floor on which there is visible standing water (Figure 171) or propped against a damp cellar brick wall (Figure 172). These two architectural features need to be immediately removed from the basement and properly stored in a drier space.

The wood fireplace mantels are evaluated as follows:

- mantels are stored properly in a dry location, and
- the fireplace mantels in the cellar are intact and in good condition, and
- cleaning and repair of the fireplace mantels will result only from professional recommendation, and
- any repair or maintenance of the fireplace mantels is to be executed by a qualified professional.

⁶¹ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 58.

Figure 171. One of the original 1893 wood mantels that has been removed from the fireplace surround is being improperly stored on the floor of the cellar (ERDC-CERL, 2012).



Figure 172. One of the original 1893 wood mantel (from first-floor hall) is being improperly stored when propped against a damp brick wall in the cellar (ERDC-CERL, 2012).



Figure 173. This mantel for the second-floor chamber fireplace on the northwest wall dates to 1893 (ERDC-CERL, 2012).



5.9.1 Wood stairs, handrail, and balustrade

The present enclosed stair and its trim date to the late nineteenth-century renovations (Figure 174). Originally, an open stair was located in the hall. This stair was L-shaped, being located against the rear wall and turning to rise against the partition of the dining room.⁶² The two partition walls that enclose the stair tower were constructed in 1893. It is unclear if the paneling covering the partition walls was added at that time or at a later date. The handrail is of polished solid wood and attached to the paneled wall with metal brackets (Figure 176). The wood balustrade is simple in design with square newel post and square spandrels. Just a portion of the balustrade is painted (Figure 177).

Wood steps were installed at an unknown date to provide access to the cellar (Figure 175).

⁶² Woodward et al., “The Matthew Jones House at Fort Eustis, Virginia, A Case Study of Historic Preservation,” page 4.

5.9.2 Immediate concerns for wood stairs, handrail, and balustrade

The wood stairs, handrail, and balustrade (Figure 174–Figure 177) are evaluated as follows:

- the handrail is securely attached to the partition wall, and
- the stairs are stable, with no missing pieces, or loose pieces, and
- the balustrade is stable with no missing pieces or loose pieces, and
- the steps to the cellar are stable, while checking for wood rot since these steps are subject to soaking up standing water from cellar floor or taking in water from the damaged, open cellar doors, and
- cleaning and repainting of the stairs and balustrade follow the standards, and
- any repair or maintenance of the stairs or balustrade is to be executed by a qualified professional.

Figure 174. Stair passage with wood partition walls (ERDC-CERL, 2012).



Figure 175. Wood steps leading to the cellar (ERDC-CERL, 2012).



Figure 176. Polished wood handrail and wood paneling of the enclosed stair passage (ERDC-CERL, 2012).



Figure 177. Upper stair passage balustrade (ERDC-CERL, 2012).



5.9.3 Electrical

The house was electrified in the early twentieth century with “knob and tube” wiring (Figure 178). Until the renovation of 1993, it was the only electrical wiring in the house.⁶³ Newer fixtures have been added throughout the house (Figure 178–Figure 181).

5.9.4 Immediate concerns for electrical

All of the lighting in the Matthew Jones House is not original to the construction of the house or the subsequent renovations that followed. It is important to note that replacement lighting used for displays or office functions should not detract from the historic elements of the house.

The electrical components (Figure 178–Figure 181) are evaluated as follows:

- the electrical is intact in good condition, and
- replacement lighting should not detract from the historic character of the Matthew Jones House.

⁶³ The Matthew Jones House at Fort Eustis, Virginia. A Case Study of Historic Preservation, page 13.

Figure 178. Electric wires and insulators (ERDC-CERL, 2012).



Figure 179. Replacement light fixture in the cellar (ERDC-CERL, 2012).

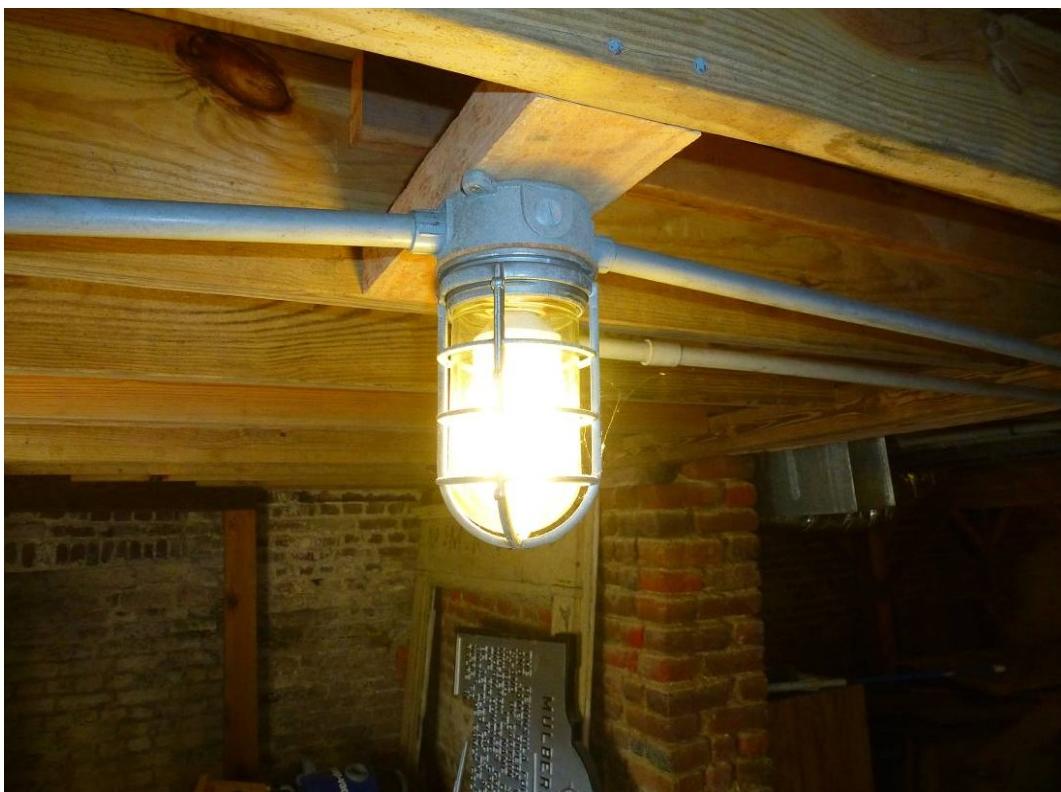


Figure 180. Display light fixtures positioned in the south corner of the two-story hall space (ERDC-CERL, 2012).



Figure 181. Addition of fluorescent tube lighting the second-floor chamber over the dining that is now being used for office space (ERDC-CERL, 2012).



5.9.5 Hardware

The interior hardware found within the Matthew Jones House is in fair condition (Figure 182–Figure 187). There is a mixture of types of door knob including conversion door sets and mortise lock sets of brass and porcelain. Any new hardware should be in-kind to that of the period of significance per door or window that is being highlighted as a teaching tool for the architectural-study museum.

5.9.6 Immediate concerns for hardware

The interior hardware on the Matthew Jones house is in fair condition.

Restore where possible to preserve the integrity of the house. If any work is done on the hardware, it should be sympathetic to the significant qualities of the historic property.

The hardware elements (Figure 182–Figure 187) are evaluated as follows:

- the hardware is rusting and will need to be cleaned, and
- the hardware shows signs of daily use and wear as the finishes are wearing, and
- the hardware needs to be maintained on a yearly basis in order to insure that it will continue to function properly, and
- rusty hinges and door hardware are cleaned.

Figure 182. Typical door hardware with painted knob (ERDC-CERL, 2012).

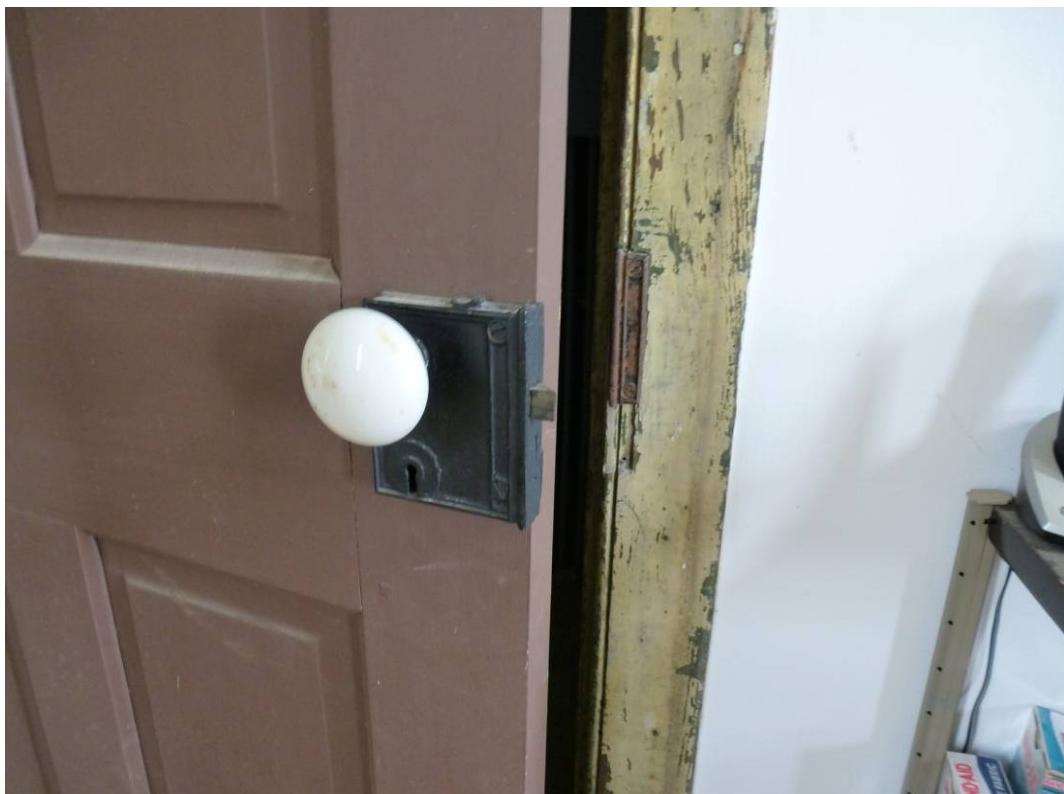


Figure 183. Rusted door hinge (ERDC-CERL, 2012).

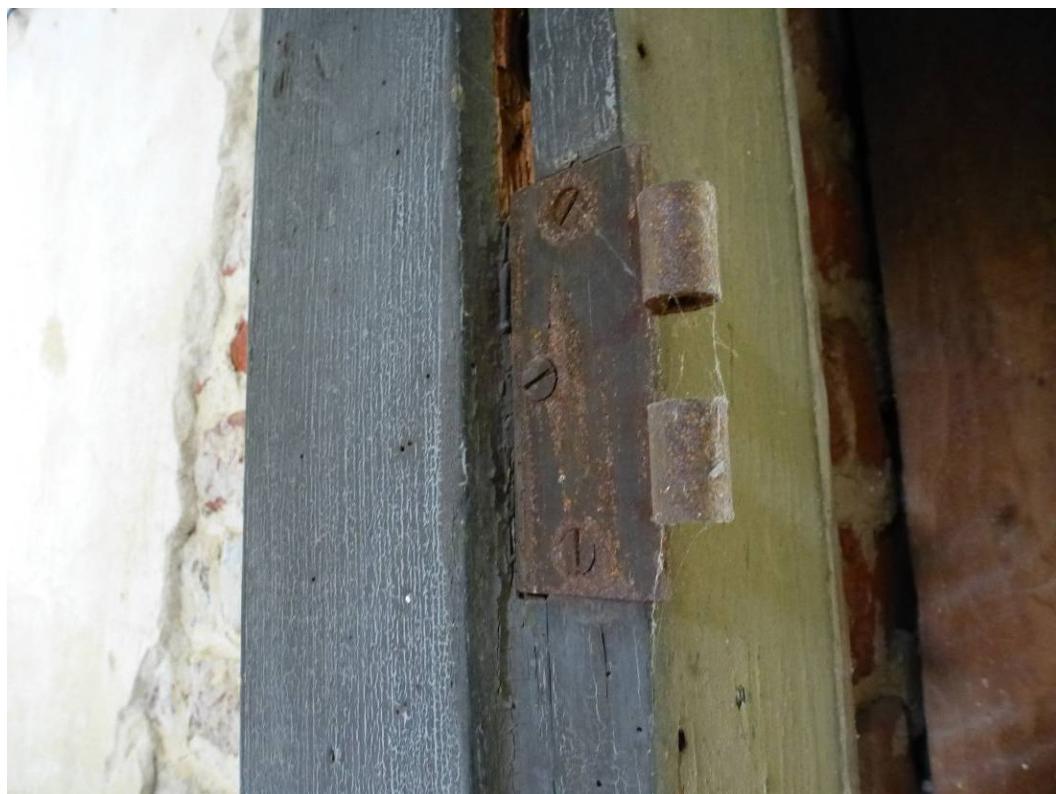


Figure 184. Original door hardware with newer deadbolt attachment
(ERDC-CERL, 2012).

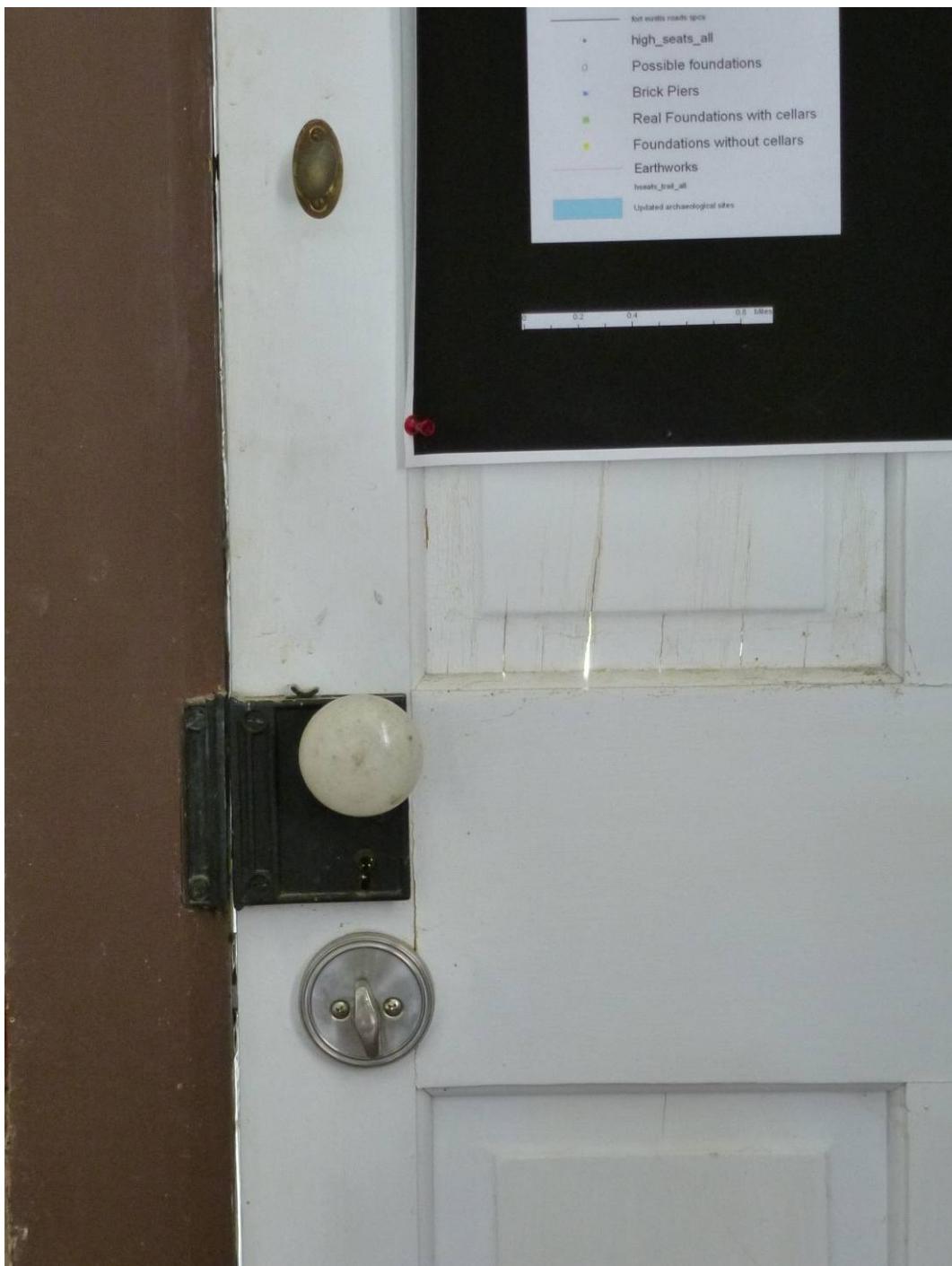


Figure 185. Brass door hardware (ERDC-CERL, 2012).



Figure 186. View of both sides of the porcelain door hardware (ERDC-CERL, 2012).

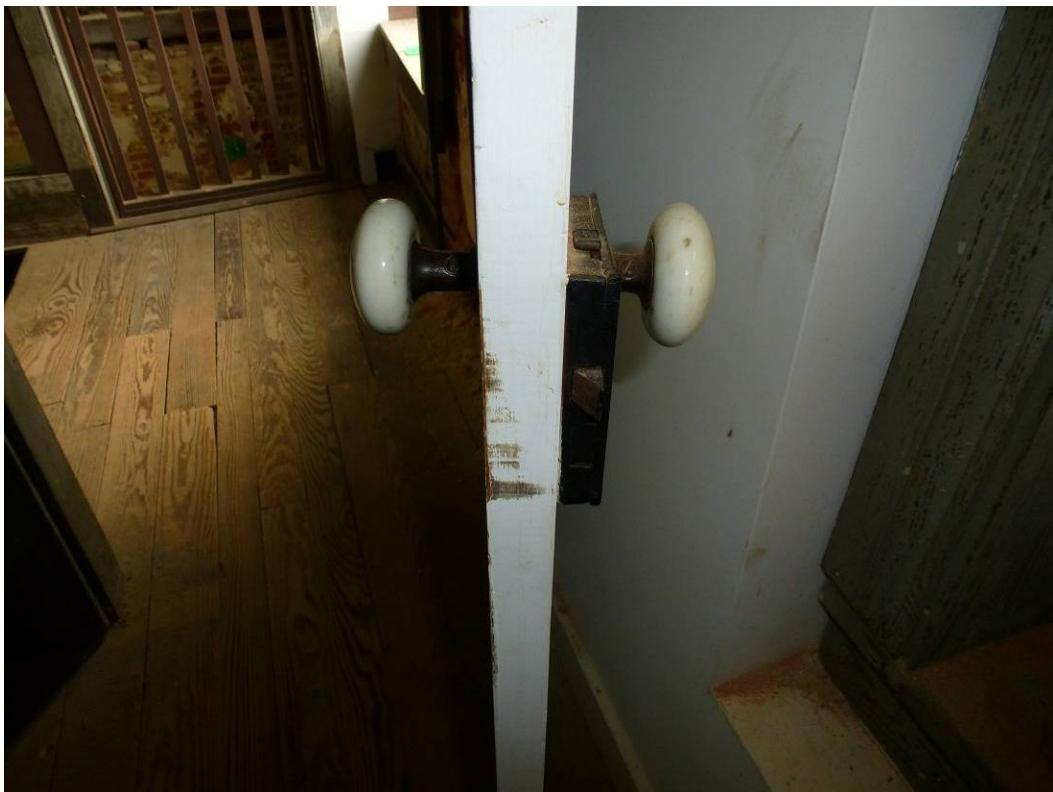


Figure 187. Window latch (ERDC-CERL, 2012).



5.9.7 Plaster

The original three-coat lime plaster that was used almost exclusively until the end of the nineteenth century is unmatched in its strength and durability, and is very fire and acoustic resistant.

Plaster was added to the interior brick wall during the Period II construction. The plaster was applied directly to the interior surface of the bricks. If moisture migration to the interior were a major issue, most plaster would be perpetually damp.

5.9.8 Immediate concerns for plaster

Same as the interior brick concerns described above, the plaster issues need to be addressed immediately (Figure 188–Figure 195). The CRM staff needs to immediately hire a professional knowledgeable in architectural plaster conservation.

Replacing original lime and gypsum plaster can be very costly. Even when the original plaster appears quite damaged from moisture or structural movement, it can often be satisfactorily repaired without complete re-

placement. However, the process of plaster repair should be completed by a qualified plaster specialist as there are many factors that contribute to failed plaster, and very precise and correct actions must be taken to make proper repairs. The analysis of what to do and the performance of those actions both take considerable experience and skill.

The professional should perform a thorough investigation of all plaster wood in the Matthew Jones House to determine which areas of plaster are too far gone and to determine the type of deterioration that is attacking the plaster.

In an interior repair context, the important factor is material and building system compatibility. This makes a bigger difference the more extreme or aggressive the environment. If the interior of the building has large range of humidity or temperature swings the compatibility issue becomes more critical.

In-kind replacement s are considered the appropriate method of repair, the repair should be the same or softer than the original plaster, so any loss that occurs, occurs from the repair not the original material.

Overall care should be taken to protect the original brick and mortar. Where plaster is extremely deteriorated, replacement in-kind must occur.

The brick and mortar (Figure 188–Figure 195) are evaluated as follows:

- the plaster is not structurally and architecturally intact, and
- maintenance of the plaster needed for it to continue to function as it was designed, and
- there should be an investigation to determine the strength of the plaster as system, and to determine if there is imminent danger of the loss of plaster due to collapse, and
- at the plaster surface, analyze any pattern of deterioration, and
- determine the cause or causes of the problem, and

- damaged surfaces should be cleaned and repaired as per preservation standards laid out in this manual by a professional, and
- repairs are needed as necessary with materials that are like in appearance and mechanical properties, and/or
- standard preventive maintenance practices and building conservation methods have not been followed, and/or
- there is a reduced life expectancy of affected or related building materials and/or systems, and/or
- there is a condition with long-term impact beyond 5 years.

Figure 188. Failing plaster (ERDC-CERL, 2012).



Figure 189. Plaster has fallen off the top half of the brick wall (ERDC-CERL, 2012).



Figure 190. Here there are cracks in plaster wall (ERDC-CERL. 2012).



Figure 191. Equipment should be moved away from plaster walls (ERDC-CERL, 2012).



Figure 192. Failing plaster is evident with the piles of “dust” on the wood floor in the shed room (rear chamber) addition adjacent to the fireplace (ERDC-CERL, 2012).



Figure 193. Plaster and brick dust pile around the steel rod enforcement in the upper stair passage on the northeast wall (ERDC-CERL, 2012).

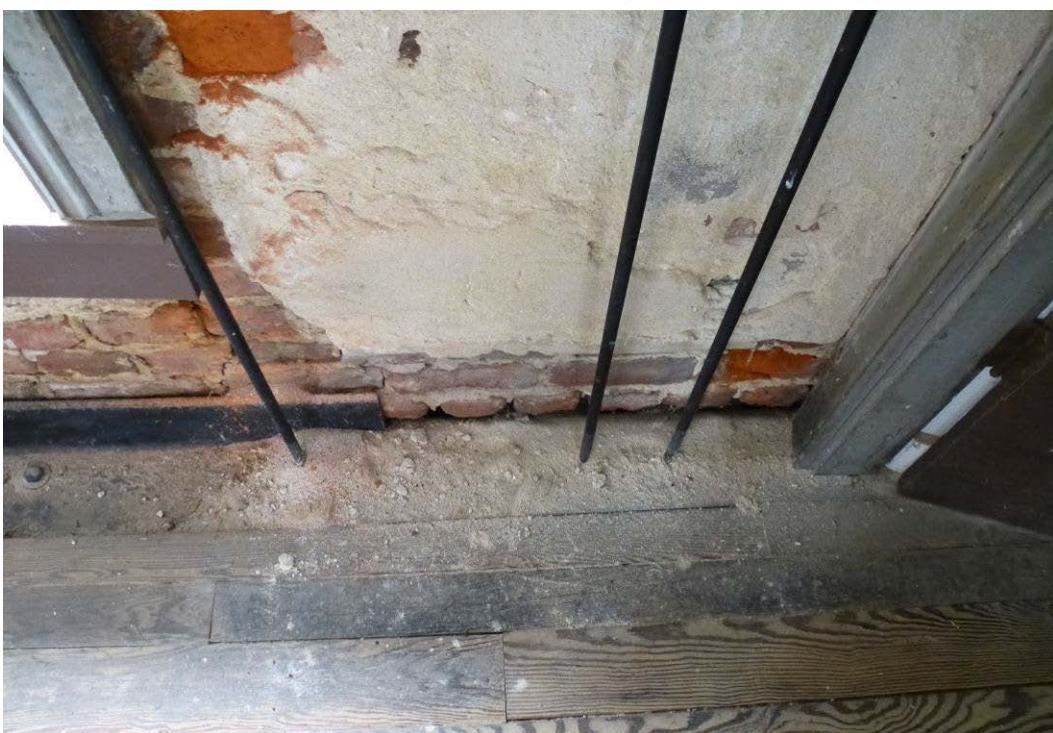


Figure 194. Vertical cracks in the plaster flanking the fireplace are Period I features caused by knee wall studs, left in place during both the ca. 1730 and 1893 renovations. They were plastered over in 1893 and are represented here by cracks in the plaster (ERDC-CERL, 2012).



Figure 195. Long vertical crack in plaster. Located in the upper chamber room on the southeast (now office) over the dining room (ERDC-CERL, 2012).



5.9.9 Wood millwork and floors

The original floorboards were 8-10 inches wide. The floor joists were hewn and pit sawn of oak and measure 4x8 inches. The joists date to the Period II.⁶⁴

The floorboards shown in Figure 197 were installed in the late nineteenth century, replacing wider heart-pine boards installed ca. 1730. Note the circular saw marks on the bottom face, indicative of timber preparation after the middle of the nineteenth century. Some of the floorboards were replaced during the 1993 preservation efforts.

The majority of the original millwork including window and door jambs and baseboard trim in the Matthew Jones House dates to Period III, the 1893 remodeling. The laminated arched door trim around the door leading from the porch to the main block of the house is virtually the only trim from the eighteenth century to survive in the house (Figure 203).

5.9.10 Immediate concern for wood millwork and floor

The millwork and flooring are associated with those qualities for which the Matthew Jones House was designated a historic property, and the millwork and flooring contributes to the significance and historic appearance with most of it dating to Period III, 1893.

The only immediate concern is part of the flooring in the Matthew Jones House. During the 1993 preservation efforts, a new HVAC system was installed. In order to conceal the floor vents in both the hall and dining rooms, narrow slits were cut into the floorboards. It is a great design and an unobtrusive way of hiding modern HVAC equipment. However, currently the HVAC system is not calibrated correctly for either space, and condensation and moisture are allowed to come in contact with the floorboards adjacent to these vent slits (Figure 200).

The millwork and flooring (Figure 196–Figure 208) are evaluated as follows:

- the millwork and flooring are intact and in good condition, and

⁶⁴ Linebaugh, Graham, and Patrick, *Preservation Plan for the Matthew Jones House*, 51.

- the slit vents in the floorboards is to be investigated since there is moisture on the wood flooring near the vent openings, and
- cleaning and repair of the millwork and flooring will result only from professional recommendation, and
- any repair or maintenance of the millwork and flooring is to be executed by a qualified professional.

Figure 196. Floorboards (in ceiling above) in the tower (ERDC-CERL, 2012).



Figure 197. Typical wood floorboards located throughout the Matthew Jones House (ERDC-CERL, 2012).

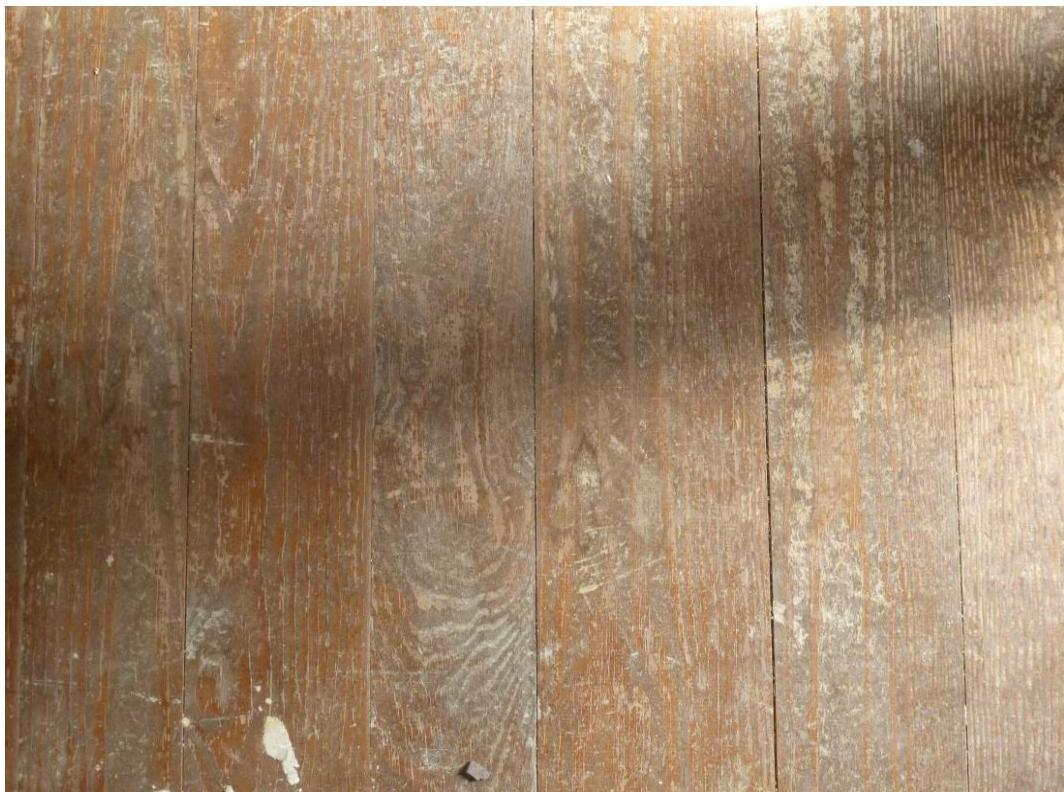


Figure 198. Equipment should be moved off the wood floor throughout the house (ERDC-CERL, 2012).



Figure 199. Gap between floor boards and brick wall where the baseboard and the shoe molding have been removed (ERDC-CERL, 2012).



Figure 200. A newer HVAC vent has been cut in narrow slits in various places in the wood floor. The moisture from the HVAC system is damaging the floorboards (ERDC-CERL, 2012).

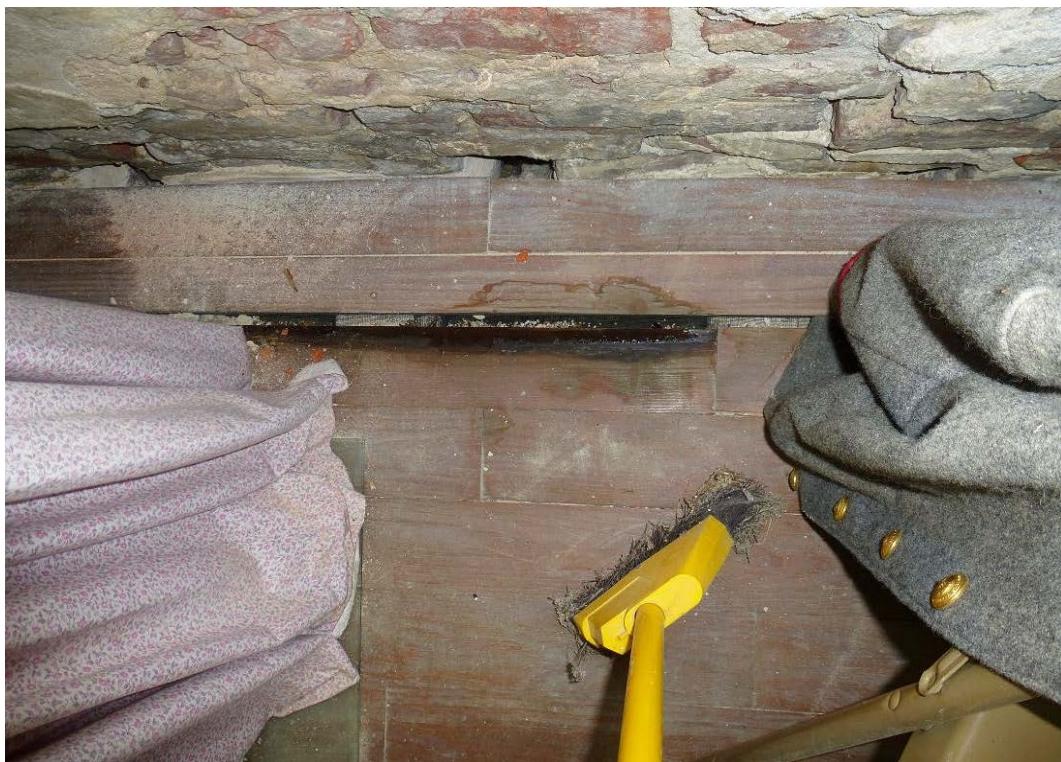


Figure 201. Second-floor tongue and groove floorboards (ERDC-CERL, 2012).



Figure 202. Second-floor wood floor (ERDC-CERL, 2012).



Figure 203. The laminated arched door jamb trim is virtually the only trim from the eighteenth century to survive in the house (ERDC-CERL, 2012).



Figure 204. All jambs throughout the house were replaced in the late nineteenth century (ERDC-CERL, 2012).



Figure 205. Close-up of wood trim against brick wall in the porch tower
(ERDC-CERL, 2012).



Figure 206. Paint is failing on the wood window trim (ERDC-CERL, 2012).



Figure 207. Wood baseboard that is throughout house from Period III
(ERDC-CERL, 2012).

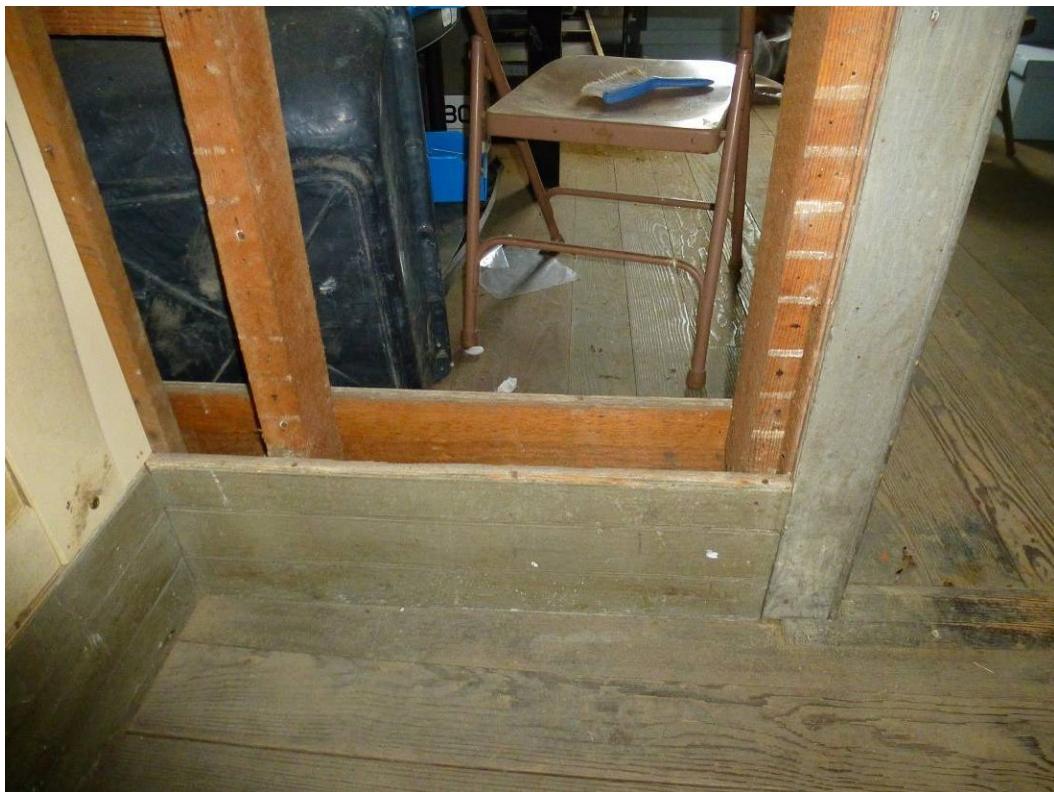


Figure 208. Wood beadboard (ERDC-CERL, 2012).



5.9.11 Maintenance / management guidelines for all interior features and finishes

According to *The Secretary of Interior's Standards for Rehabilitation*,⁶⁵ the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic interior wood are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at <http://www2.cr.nps.gov/tps/tax/rhb/stand.htm>.

Identify, retain, and preserve

Recommended:

- Identifying, retaining, and preserving architectural historic interior wood features such as baseboards, door millwork, window millwork, mantels, floors, cabinetry, and stairs, and/or railings that are important in defining the overall historic character of the building; and their finishes and colors. Identification is also critical to differentiate between hardwoods and softwoods prior to work. Each type of wood has unique properties and thus requires different treatments.

Not recommended:

- Removing or radically changing architectural historic interior wood, which are important in defining the overall historic character of the building so that, as a result, the character is diminished.
- Radically changing the type of finish or its historic color or accent scheme.

Protect and maintain

Recommended:

- Remove damaged or deteriorated paint only to the next sound layer using the gentlest means possible (handscraper, wire brush, or sand paper), then repaint. Stripping methods including hot air guns, heat plates, and chemical or dip stripping should be employed with great care, and only as a supplement to handscraping, brushing and sanding.
- Apply specification-approved primer and paint following proper surface preparation and product instructions.

⁶⁵ Grimmer, et al., *Secretary of the Interior's Standards for Rehabilitation*.

- Inspect regularly for wood that is excessively or continually moist and for evidence of insect infestation and fungal rot.
- Address evidence of moisture infiltration and infestation as soon as possible.
- Use only hot-dipped, zinc-coated nails, bolts, and hardware for use on treated wood.
- Countersink and putty all new, exposed nails and screws according to general specifications.

Not recommended:

- Replacing, rebuilding, or altering any original wood features that could be preserved or consolidated.
- Introducing new or non-specific brands of paint, colors or methods of application.
- Failing to identify, evaluate, and treat the causes of wood deterioration, including insect or fungus infestation.
- Using chemical preservatives (such as creosote) which can change the appearance of wood features.
- Using destructive paint removal methods such as propane or butane torches, sandblasting, or waterblasting. These methods can irreversibly damage historic woodwork.
- Using thermal devices improperly when removing paint so that historic woodwork is scorched or damaged.
- Failing to neutralize wood thoroughly after using chemicals so the new paint does not adhere.
- Allowing detachable wood features, like doors, to soak too long in a caustic solution so that the wood grain is raised and the surface roughened.

Repair

Recommended:

- Fill moderate-sized holes and check cracks with putty or epoxy filler. Repair should be applied as per general specifications.
- Repair fragile original wood using well-tested consolidants when appropriate. Repairs should be physically, visually, and chemically compatible and identifiable upon close inspection

Not recommended:

- Removing or replacing original wood that could be stabilized and conserved, or repaired with limited replacement of deteriorated or missing parts.
- Using substitute materials that are physically, visually, or chemically incompatible with the original materials.

Replace

Recommended:

- Replace deteriorated or damaged wood by carefully patching, piecing-in, or otherwise reinforcing the wood using recognized preservation methods. Replacement work should be permanently dated in an unobtrusive location.

Not recommended:

- Removing an original wood feature that is repairable. Removing an original wood feature that is unrepairable and not replacing it, or failing to label the new work.

5.9.12 Wood doors

Doors are hinged and made of wood. They are used for opening and closing an entrance to a building, room, or cabinet. Interior doors act as noise barriers, provide privacy, and serve to separate different uses inside the building.

5.9.13 Immediate concerns for wood doors

The doors represent historic fabric, they contribute to the significance and historic appearance of the Matthew Jones House, and they are an integral part of the building's historic construction.

The wood doors (Figure 209–Figure 213) are evaluated as follows:

- All of the interior doors are good or better, and
- any wood door that is not attached to a frame and not being used (e.g., the wood door found in the cellar; Figure 209), should be stored in a dry place, and
- the wood frame around each door needs to be addressed, repainted, and
- the wood is scraped, primed, and repainted, and/or
- any broken elements are repaired or replaced as necessary, and
- any repairs to the wood are made after cleaning the surface gently if necessary, and/or

- damaged wood is repaired and treated as per preservation standards, and/or
- standard preventive maintenance practices and building conservation methods have not been followed.

5.9.14 Maintenance / management guidelines for wood doors

According to *The Secretary of Interior's Standards for Rehabilitation*,⁶⁶ the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the historic wood doors are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at www.nps.gov/tps/standards/rehabilitation/rehab/wood01.htm.

Protect and maintain

Recommended:

- Regular cleaning and removal of loose paint prior to reapplication with specification-approved finish.
- Install and maintain caulk and weather-strip on exterior units to maximize energy efficiency.
- Periodic lubrication of operable hinges and hardware to extend life and inhibit corrosion.

Not recommended:

- Applying excessive layers of paint to hardware, introducing new or non-specified brands of paint, colors, or methods of application.

Repair

Recommended:

- Repair missing hardware or doors with salvage or in-kind material.
- Repainting doorframes by patching, splicing, consolidating or otherwise reinforcing.

⁶⁶ Grimmer et al., *The Secretary of the Interior's Standards for Rehabilitation*.

Not recommended:

- Replacing an entire door when repair of materials and limited replacement of deteriorated or missing parts is appropriate.
- Failing to reuse serviceable door hardware.
- Using substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the door or that is physically or chemically incompatible.

*Replace**Recommended:*

- Restore, repair and reutilize original remaining material, including wood frames, surrounds, and sills, as much as is practicable.
- Replace non-original doors and hardware with salvage of in-kind, specification-approved units painted to match original. Replacement units should be permanently dated in an inconspicuous location.

Not recommended:

- Using a substitute unit that is physically incompatible with the character of the historic original doors.

Figure 209. Doors that have been removed and are being stored should be stored in a dry place, unlike this one which is lying on the cellar floor (ERDC-CERL, 2012).



Figure 210. This door leads from the porch tower to the main block of the house. It is a reproduction of that installed in 1893 (ERDC-CERL, 2012).

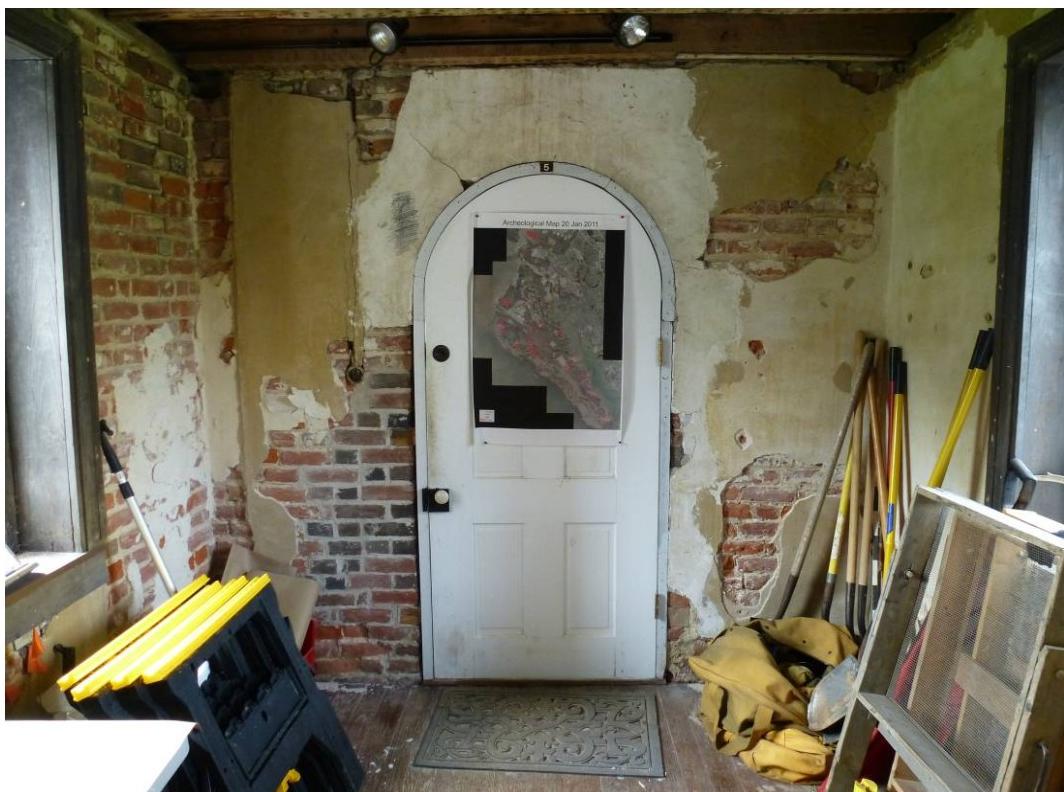


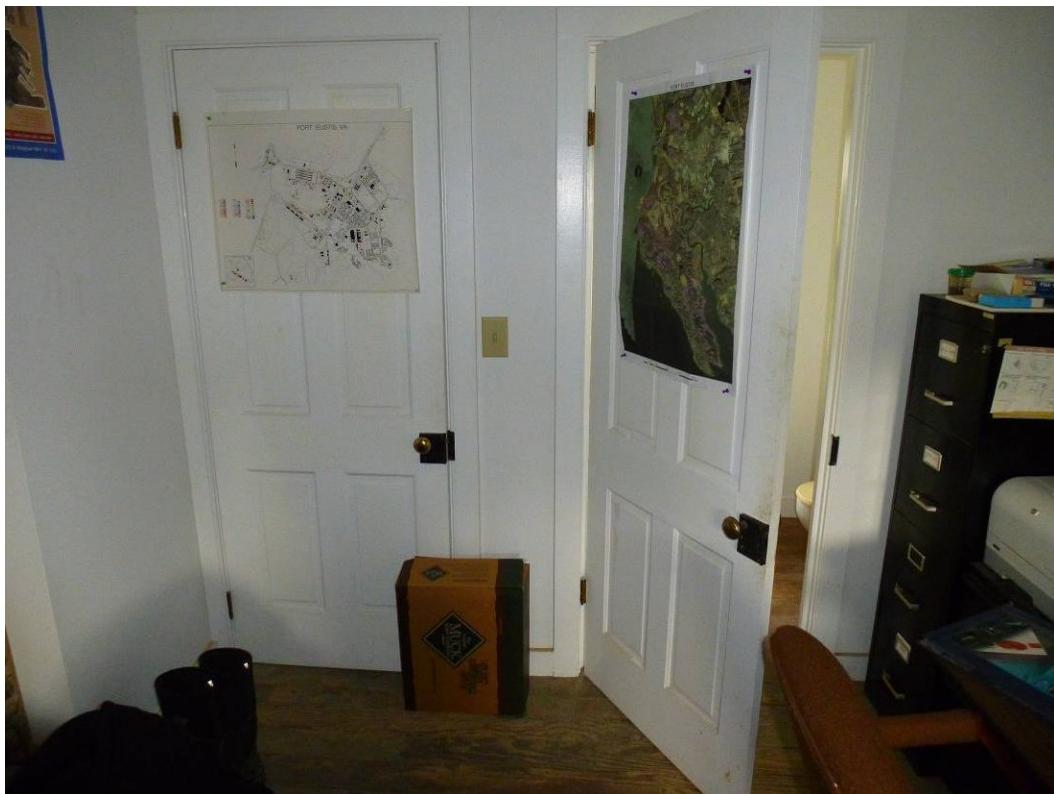
Figure 211. Typical wood panel interior door that has been painted
(ERDC-CERL, 2012).



Figure 212. Unpainted wood panel door once leading from upper stair passage to upper chamber over hall (ERDC-CERL, 2012).



Figure 213. Wood panel doors that were added when the partition wall was built in the upper chamber (now office) over the dining room (ERDC-CERL, 2012).



5.10 Heating, ventilation, and cooling

Making the most of a building's original, passive climate-control features can reduce system requirements and the impact of the HVAC installation on historically significant spaces. Sensitively installing ductwork in buildings designed to accommodate only heating and natural ventilation presents one of the greatest challenges involved in upgrading historic buildings to meet current codes and comfort standards. Fan coil units are a popular choice for historic buildings because pipes are smaller and less intrusive than the ducting required for forced-air systems.⁶⁷

Thoughtful routing, configuration, and concealment of ductwork plays a major role in the aesthetic success of HVAC retrofitting projects at historic buildings. When a system is designed, it is important to anticipate how it

⁶⁷ Excerpt from Caroline. Alderson, *HVAC Upgrades in Historic Buildings*. (Technical Preservation Guidelines series). Washington, DC: US General Services Administration, Center for Historic Buildings, 2009. Available at: <http://www.gsa.gov/graphics/pbs/HVAC.pdf>.

will be installed, how damage to historic materials can be minimized, and how visible the new mechanical system will be within the restored or rehabilitated space.⁶⁸

5.10.1 Climate control and preservation

Although twentieth century mechanical systems technology has had a tremendous impact on making historic buildings comfortable, the introduction of these new systems in older buildings is not without problems. The attempt to meet and maintain modern climate control standards may in fact be damaging to historic resources. Modern systems are often over-designed to compensate for inherent inefficiencies of some historic buildings materials and plan layouts.⁶⁹

In general, the greater the differential between the interior and exterior temperature and humidity levels, the greater the potential for damage. As natural vapor pressure moves moisture from a warm area to a colder, drier area, condensation will occur on or in building materials in the colder area. Too little humidity in winter, for example, can dry and crack historic wooden or painted surfaces. Too much humidity in winter causes moisture to collect on cold surfaces, such as windows, or to migrate into walls. As a result, this condensation deteriorates wooden or metal windows and causes rotting of walls and wooden structural elements, dampening insulation and holding moisture against exterior surfaces. Moisture migration through walls can cause the corrosion of metal anchors, angles, nails or wire lath, can blister and peel exterior paint, or can leave efflorescence and salt deposits on exterior masonry. In cold climates, freeze/thaw damage can result from excessive moisture in external walls.⁷⁰

To avoid these types of damage to an historic building, it is important to understand how building components work together as a system. Methods for controlling interior temperature and humidity and improving ventilation must be considered in any new or upgraded HVAC or climate control system.

⁶⁸ Excerpt from Alderson, *HVAC Upgrades in Historic Buildings..*

⁶⁹ Excerpt from Sharon C. Park, *Preservation Brief 24: Heating, Ventilating, and Cooling Historic Buildings—Problems and Recommended Approaches*. (Washington, DC: US Department of the Interior, National Park Service, Technical Preservation Services, n.d.)

Available at: <http://www.nps.gov/tps/how-to-preserve/briefs/24-heat-vent-cool.htm>.

⁷⁰ ibid.

5.10.2 Planning the new system

Climate control systems are generally classified according to the medium used to condition the temperature: air, water, or a combination of both. The complexity of choices facing a building owner or manager means that a systematic approach is critical in determining the most suitable system for a building, its contents, and its occupants. No matter which system is installed, a change in the interior climate will result. This physical change will in turn affect how the building materials perform. New registers, grilles, cabinets, or other accessories associated with the new mechanical system will also visually change the interior (and sometimes the exterior) appearance of the building. Regardless of the type or extent of a mechanical system, the owner of an historic building should know before a system is installed what it will look like and what problems can be anticipated during the life of that system. The potential harm to a building and costs to an owner of selecting the wrong mechanical system are very great.⁷¹

The use of a building and its contents will largely determine the best type of mechanical system. The historic building materials and construction technology as well as the size and availability of secondary spaces within the historic structure will affect the choice of a system. It may be necessary to investigate a combination of systems. In each case, the needs of the user, the needs of the building, and the needs of a collection or equipment must be considered. It may not be necessary to have a comprehensive climate control system if climate-sensitive objects can be accommodated in special areas or climate-controlled display cases. It may not be necessary to have central air conditioning in a mild climate if natural ventilation systems can be improved through the use of operable windows, awnings, exhaust fans, and other “low-tech” means. Modern standards for climate control developed for new construction may not be achievable or desirable for historic buildings. In each case, the lowest level of intervention needed to successfully accomplish the job should be selected.⁷²

Before a system is chosen, the following planning steps are recommended:

- Determine the use of the building.
- Assemble a qualified team.

⁷¹ Excerpt from Park, *Preservation Brief 24: Heating, Ventilating, and Cooling Historic Buildings*.

⁷² *ibid.*

- Undertake a condition assessment of the existing building and its systems.
- Prioritize architecturally significant spaces, finishes, and features to be preserved.
- Become familiar with local building and fire codes.
- Evaluate options for the type and size of systems.

5.10.3 Immediate concerns for HVAC

For the Matthew Jones House, it is critical to understand what spaces, features, and finishes are historic in the building, what should be retained, and what the realistic heating, ventilating, and cooling needs are for the building, its occupants, and its contents.

Since the Matthew Jones House is treated as an architectural-study museum, the installation of the proper HVAC system should be that similar to a special climate-control system found in a building that houses museum collections.

The HVAC (Figure 214–Figure 224) is evaluated as follows:

- the existing energy-efficient characteristics should be assessed, and
- the design, materials, type of construction, size, shape, site orientation, surrounding landscape, and climate all play a role in how a building performs, and
- moisture introduced into the building as part of a new system migrates into historic materials and causes damage including biodegradation, freeze/thaw action, and surface staining, and
- when possible, install new systems that are reversible, reuse existing holes where possible, use existing interstitial spaces to conceal systems, and conceal wiring when possible, and
- original vents in the foundation wall have been blocked and should be reopened to prevent further deterioration of wood and brick elements, and

- possibly addition of a vent in the cellar doors to help with circulation of air flow, and
- any repair or maintenance of the HVAC system is to be executed by a qualified professional, and
- vegetation should be cleared from the AC units on the south side of the house.

5.10.4 Maintenance / management guidelines for all HVAC

According to *The Secretary of Interior's Standards for Rehabilitation*,⁷³ the proper procedure is to respect the significance of the original materials and features, repair and retain them wherever possible, and replace them only when absolutely necessary.

The following recommendations for care of the HVAC systems are to be thoroughly read and understood before a treatment is specified. *The Secretary of the Interior's Standards for Rehabilitation* should also be consulted to determine the appropriateness of any treatment.

The following is an excerpt from *The Secretary of the Interior's Standards for Rehabilitation*. Full documentation can be found at
www.nps.gov/tps/standards/rehabilitation/rehab/mechanical01.htm

Protect and maintain

Recommended:

- Remove inefficient HVAC systems to prevent further damage to the historic building and its character-defining architectural features.
- Supplementing the efficiency of HVAC systems with less energy-intensive measures, such as programmable thermostats, attic and ceiling fans, louvers and vents, where appropriate.
- Placing HVAC equipment where it will operate effectively and efficiently and be minimally visible and will not negatively impact the historic character of the building or its site.
- Examining the performance of the HVAC system and continuing to examine it regularly to ensure that it is operating efficiently.

⁷³ Grimmer et al., *The Secretary of the Interior's Standards for Rehabilitation*.

Not recommended:

- Placing HVAC equipment in highly-visible locations on the roof or on the site where it will negatively impact the historic character of the building or its site.

*Repair**Recommended:*

- Upgrading existing HVAC systems to increase efficiency and performance within normal replacement cycles.

Not recommended:

- Replacing HVAC systems prematurely when existing systems are operating efficiently.

*Replace**Recommended:*

- Installing an energy-efficient system that takes into account whole building performance and retains the historic character of the building and site when a new HVAC system is necessary.
- Retaining or installing high efficiency, duct-less air conditioners when appropriate, which may be a more sensitive approach than installing a new, ducted, central air-conditioning system that may damage historic building material.

Not recommended:

- Replacing existing HVAC systems without testing their efficiency first.
- Installing an inefficient HVAC system or installing a new system based on pre-retrofit building performance when a smaller system may be more appropriate.
- Installing a central HVAC system in a manner that damages historic building materials.
- Installing through-the-wall air conditioners, which damages historic material and negatively impacts the building's character.

Figure 214. Exterior AC units located on the south side of the property; the vegetation should be cut back and removed where immediately adjacent to the units (ERDC-CERL, 2012).



Figure 215. Condensation is visible on the HVAC equipment in the cellar (ERDC-CERL, 2012).



Figure 216. Either water from the ground or condensation from the HVAC system is damaging the brick cellar wall; damage is evident from the white appearance of the brick (ERDC-CERL, 2012).



Figure 217. One of the HVAC vents is insulated, but the other is not (ERDC-CERL, 2012).



Figure 218. Looking up at mold on the ceiling above the hall (ERDC-CERL, 2012).



Figure 219. The moisture from the HVAC system is causing the floorboards in the hall to become wet (ERDC-CERL, 2012).

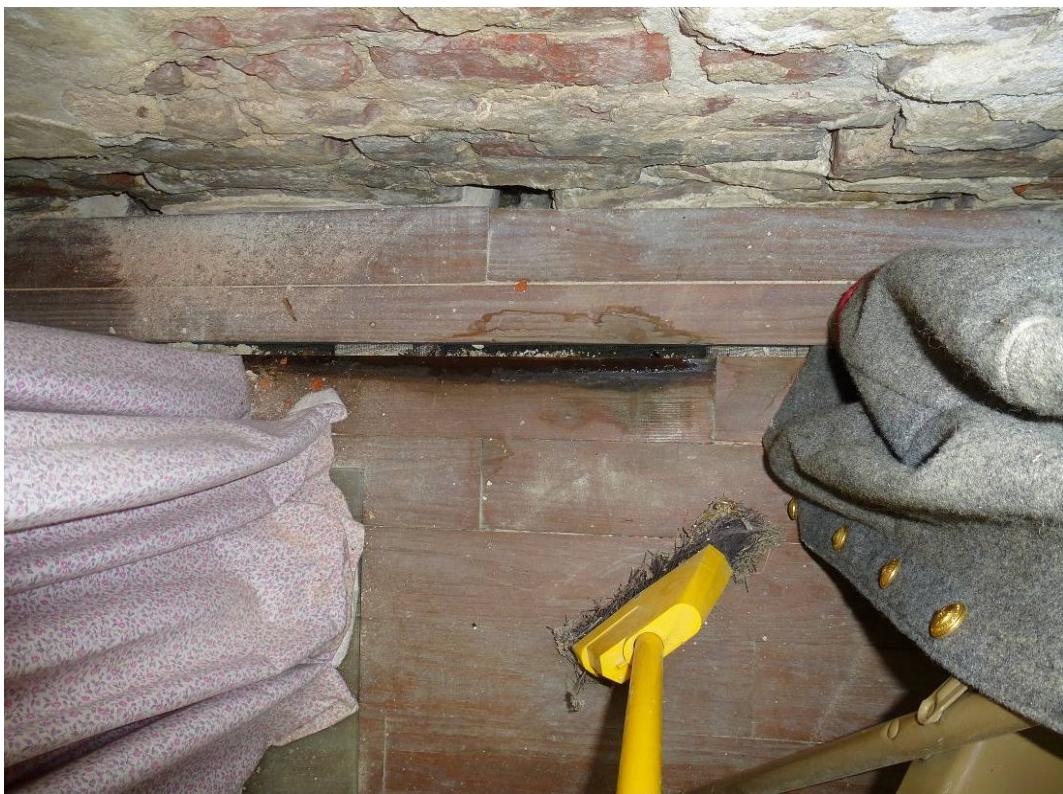


Figure 220. Cabinet should be moved off of the slit vent in the floorboard (ERDC-CERL, 2012).

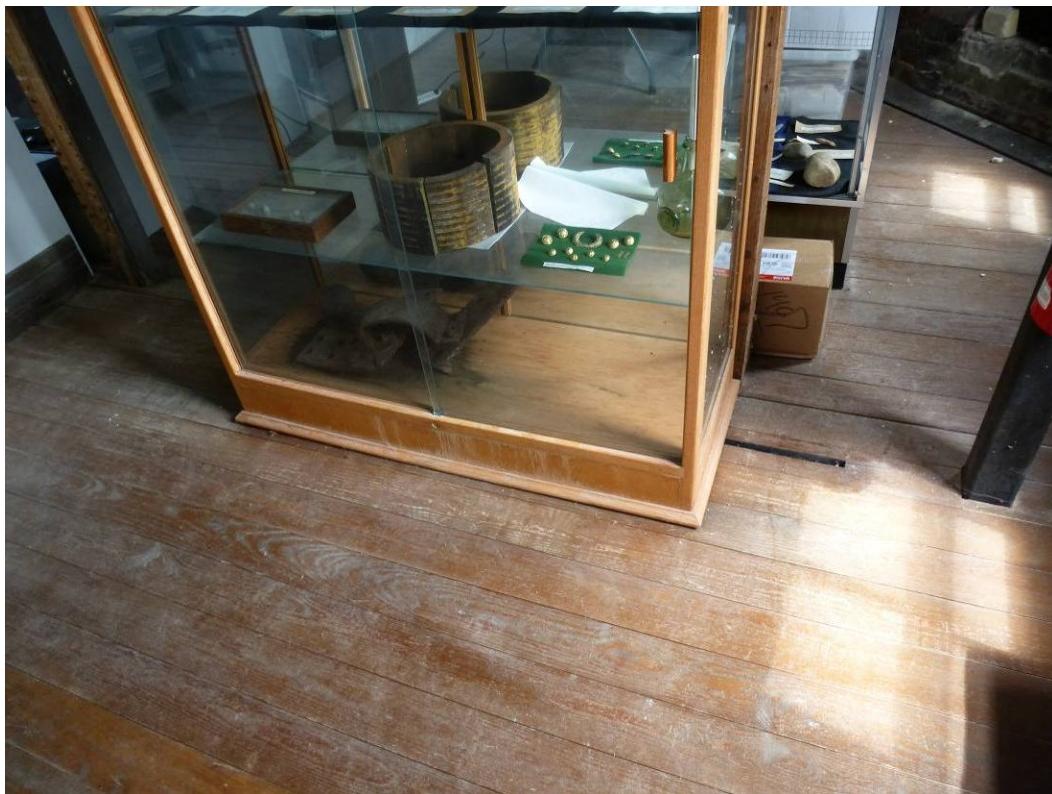


Figure 221. Debris should be cleaned out from all vents (ERDC-CERL, 2012).

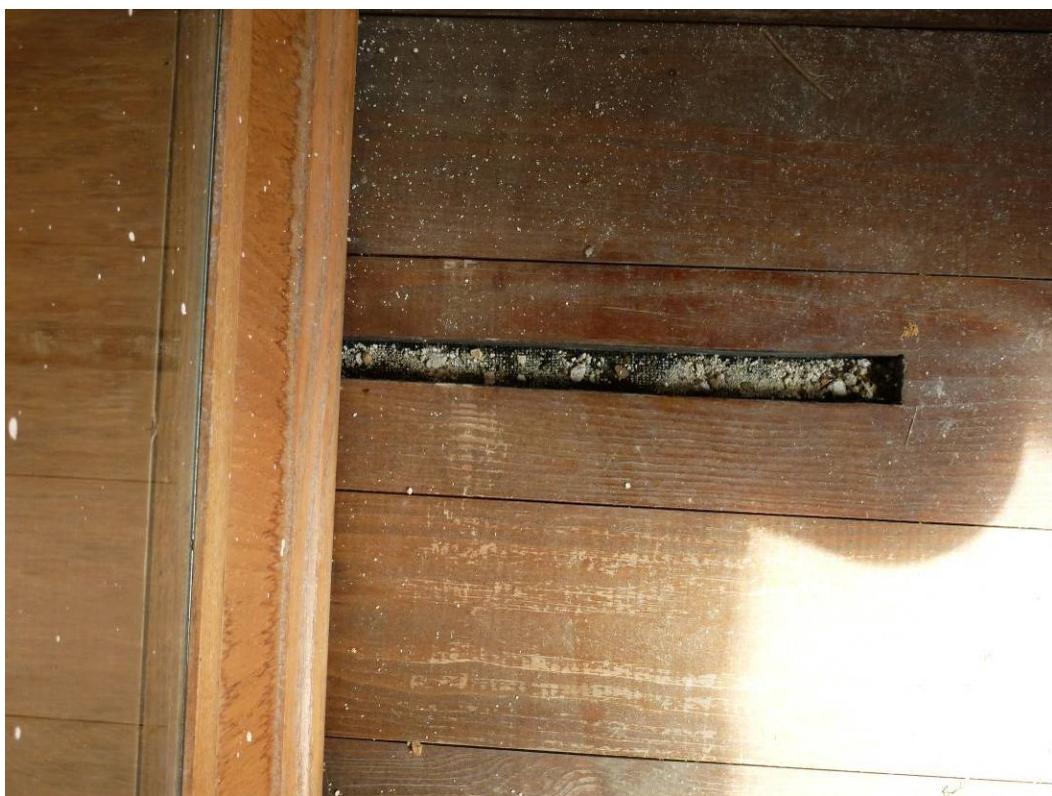


Figure 222. Electrical box is located in the small closet under the stair passage
(ERDC-CERL, 2012).



Figure 223. Ceiling vent in the second-floor chamber above the dining room. Vent is not properly attached, and mold is evident (ERDC-CERL, 2012).



Figure 224. Current thermostat controlling the HVAC system (ERDC-CERL, 2012).



5.11 Concrete

The concrete located in the cellar of the Matthew Jones House is not original to the structure. It was added during the 1993 preservation efforts.

5.11.1 Immediate concerns for concrete

Deterioration of concrete can be caused by environmental factors, inferior materials, poor workmanship, inherent structural design defects, and inadequate maintenance. Environmental factors are a principal source of concrete deterioration. Concrete absorbs moisture readily, and this is particularly troublesome in regions of recurrent freeze-thaw cycles. Freezing water produces expansive pressure in the cement paste or in nondurable aggregates.⁷⁴

Improper maintenance of historic buildings can cause long-term deterioration of concrete. Water is a principal source of damage to historic concrete, and prolonged exposure to it can cause serious problems. Unrepaired roof and plumbing leaks, leaks through exterior cladding, and unchecked absorption of water from damp earth are potential sources of building damage.⁷⁵

The concrete (Figure 225) is evaluated as follows:

- No major cracks have formed within the concrete floor, and
- the concrete shows signs of standing water, and
- any materials or equipment need to be stored properly and not directly on top of the concrete floor, and
- any repair or maintenance of the concrete is to be executed by a qualified professional.

⁷⁴ Excerpt from Paul Gaudette and Deborah Slaton, *Preservation Brief 15: Preservation of Historic Concrete: Problems and General Approaches*. (Washington, DC: US Department of the Interior, National Park Service, Technical Preservation Services, n.d.)

Available at: <http://www.nps.gov/tps/how-to-preserve/briefs/15-concrete.htm>.

⁷⁵ ibid.

Figure 225. Water is being allowed to pool on the concrete cellar floor. The pipe is coming from the HVAC unit but does not meet the drain in the floor (ERDC-CERL, 2012).



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Appendix A: Maintenance Log

The following page presents a sample maintenance log which may be reproduced as needed to maintain a detailed record of conditions and maintenance performed at the Matthew Jones House.

Appendix B: Guidelines, Briefs, Bulletins, and Sources⁷⁶

In addition to the information contained in this manual, the authors have compiled the following federal resource publications (with links for online accessibility) to inform managers about standards, guidelines, and procedures for understanding architecture, and caring for and rehabilitating historic buildings.

General

The Secretary of Interior's Standards for Rehabilitation (procedure code: 0109104S): <http://www.gsa.gov/portal/content/112178>

Guidelines for Rehabilitating Historic Buildings: General (procedure code 0109105S): <http://www.gsa.gov/portal/content/112186>

Preservation Briefs: 35 Understanding Old Buildings: The Process of Architectural Investigation (procedure code: 0110015S):
<http://www.gsa.gov/portal/content/112566>

Masonry

Guidelines for Rehabilitating Historic Buildings: Masonry (procedure code: 0109106S): <http://www.gsa.gov/portal/content/112190>

Brick Problems and Deterioration (procedure code: 0421108S):
<http://www.gsa.gov/portal/content/112570>

Guidelines for Evaluating the Condition of Brick Masonry and Mortar (procedure code: 0421109S): <http://www.gsa.gov/portal/content/111686>

Removing and Replacing Deteriorated Brick Masonry (procedure code: 0421102R): <http://www.gsa.gov/portal/content/111798>

Monitoring and Evaluating Cracks in Masonry (procedure code: 0420002S): <http://www.gsa.gov/portal/content/111626>

⁷⁶ Full documentation can be found at:
<http://www.gsa.gov/portal/hpc/category/100371/hostUri/portal/searchBy/ALL#Wood>

Patching Cracks in Brick Masonry (procedure code: 0421103R):
<http://www.gsa.gov/portal/content/112838>

Preservation Briefs: 2 Repointing Mortar Joints in Historic Brick Structures (procedure code: 0421107S): <http://www.gsa.gov/portal/content/113478>

Preparing Lime Mortar for Repointing Masonry (procedure code: 0410003S): <http://www.gsa.gov/portal/content/111682>

Repointing Masonry Using Lime Mortar (procedure code: 0452002R):
<http://www.gsa.gov/portal/content/111722>

General Cleaning of Exterior Brick Masonry (procedure code: 0421104R):
<http://www.gsa.gov/portal/content/112842>

Preservation Briefs: 6 Dangers of Abrasive Cleaning to Historic Buildings (procedure code: 0451005S): <http://www.gsa.gov/portal/content/111970>

Removing Dirt from Brick Masonry (procedure code: 0421109R):
<http://www.gsa.gov/portal/content/113358>

Removing Biological Growth from Exterior Masonry and Stucco (procedure code: 0420002R): <http://www.gsa.gov/portal/content/111774>

Wood

Guidelines for Rehabilitating Historic Buildings: Wood (procedure code: 0109107S): <http://www.gsa.gov/portal/content/112194>

Primers and Paints for Wood (procedure code 0630001S):
<http://www.gsa.gov/portal/content/113070>

Replacing Deteriorated Woodwork (procedure code: 0640015R):
<http://www.gsa.gov/portal/content/113838>

Repairing Water Damaged Woodwork (procedure code 0640011R):
<http://www.gsa.gov/portal/content/113826>

Select Readings of Wood Flooring (procedure code 0955001S):
<http://www.gsa.gov/portal/content/112418>

Plaster

Guidelines for Lathing and Plastering Walls and Ceilings (procedure code 0920002S): <http://www.gsa.gov/portal/content/112762>

Preservation Briefs: 21 Repairing Historic Flat Plaster – Walls and Ceiling (procedure code 090001S): <http://www.gsa.gov/portal/content/112102>

Roofing

Guidelines for Rehabilitating Historic Buildings: Roofs (procedure code: 0109109S): <http://www.gsa.gov/portal/content/112202>

Preservation Briefs: 19: The Repair and Replacement of Historic Wooden Shingle Roofs (procedure code: 0110028S):
<http://www.gsa.gov/portal/content/143327>

Preservation Briefs: 4 Roofing for Historic Buildings (procedure code 0756001S): <http://www.gsa.gov/portal/content/113134>

Selected Readings on General Waterproofing and Roofing (procedure code: 071002S): <http://www.gsa.gov/portal/content/112366>

General Inspection and Maintenance of Gutters and Downspouts (procedure code 0763101S): <http://www.gsa.gov/portal/content/112054>

Windows

Guidelines for Rehabilitating Historic Buildings: Windows (procedure code: 0109110S): <http://www.gsa.gov/portal/content/112206>

Preservation Briefs: 9 The Repair of Historic Wooden Windows (procedure code 0861001S): <http://www.gsa.gov/portal/content/113482>

Preservation Tech Notes: Windows 4 Replacement Wooden Frames and Sash: Protecting Woodwork Against Decay (procedure code: 0861002S):
<http://www.gsa.gov/portal/content/113166>

Preservation Tech Notes: Windows 6 Replacement Wooden Sash and Frame with Insulating Glass and Integral Muntins (procedure code 0861003S): <http://www.gsa.gov/portal/content/113170>

Preservation Tech Notes: Windows 11 Installing Insulating Glass in Existing Wooden Sash Incorporating the Historic Glass (procedure code 0861005S): <http://www.gsa.gov/portal/content/113182>

Rehabilitating Wood Windows (procedure code 0861001R):
<http://www.gsa.gov/portal/content/112286>

Restoring Wood Window Sash and Frame (procedure code 0861006R):
<http://www.gsa.gov/portal/content/113490>

Unsticking a Wood Double-Hung Window (procedure code 0861004R):
<http://www.gsa.gov/portal/content/112074>

Replacing Broken Glass in Wood and Metal Windows (procedure code 0880001R): <http://www.gsa.gov/portal/content/112094>

Structural systems

Guidelines for Rehabilitating Historic Buildings: Structural Systems (procedure code: 0109112S): <http://www.gsa.gov/portal/content/112214>

Interior spaces, features, and finishes

Guidelines for Rehabilitating Historic Buildings: Interior Spaces, Features, and Finishes (procedure code: 0109113S):
<http://www.gsa.gov/portal/content/112218>

Preservation Briefs: 18 Rehabilitating Interiors In Historic Buildings (procedure code: 0110003S): <http://www.gsa.gov/portal/content/112182>

Mechanical systems

Guidelines for Rehabilitating Historic Buildings: Mechanical Systems (procedure code: 0109114S): <http://www.gsa.gov/portal/content/112222>

Preservation Briefs: 3 Conserving Energy in Historic Buildings (procedure code: 0110004S): <http://www.gsa.gov/portal/content/111638>

Preservation Briefs: 24 Heating, Ventilating and Cooling Historic Buildings: Problems and Recommended Approaches (procedure code 1501001S): <http://www.gsa.gov/portal/content/113318>

Landscape/site

Guidelines for Rehabilitating Historic Buildings: Building Site (procedure code: 0109115S): <http://www.gsa.gov/portal/content/112226>

Preservation Briefs: 36 Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes (procedure code 0290002S): <http://www.gsa.gov/portal/content/112802>

General Planting Procedures for Landscape Work (procedure code: 0290001R): <http://www.gsa.gov/portal/content/112730>

Preservation Briefs: 16 The Use of Substitute Materials on Historic Building Exteriors (procedure code: 0163002S):
<http://www.gsa.gov/portal/content/111654>

Maintenance

Checklist for the Routine Inspection of Buildings (procedure code: 0180001S): <http://www.gsa.gov/portal/content/111478>

Routine and Periodic Cleaning of Walls and Ceilings (procedure code 0180004P): <http://www.gsa.gov/portal/content/111662>

Recognizing Excessive Condensation in Buildings (procedure code 0180005S): <http://www.gsa.gov/portal/content/111666>

Hardware

Selected Readings on Hardware (procedure code 0870001S):
<http://www.gsa.gov/portal/content/112398>

Repairing Double-Hung Window Sash Weights and Cords/Chains (procedure code 0877001S): <http://www.gsa.gov/portal/content/112086>

REPORT DOCUMENTATION PAGE

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OMB No. 0704-0188

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1. REPORT DATE (DD-MM-YYYY) August 2014	2. REPORT TYPE Final Technical Report	3. DATES COVERED (From - To)		
4. TITLE AND SUBTITLE Matthew Jones House: Historic Maintenance and Repair Manual			5a. CONTRACT NUMBER	
			5b. GRANT NUMBER	
			5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Adam D. Smith and Sunny E. Adams			5d. PROJECT NUMBER 396574	
			5e. TASK NUMBER	
			5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Engineer Research and Development Center-Construction Engineering Research Laboratory (ERDC-CERL) PO Box 9005. Champaign, IL 61826-9005			8. PERFORMING ORGANIZATION REPORT NUMBER ERDC/CERL SR-14-6	
			10. SPONSOR/MONITOR'S ACRONYM(S)	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Environmental Element Civil Engineer Division, 733d Mission Support Group Joint Base Langley-Eustis (Eustis) 1407 Washington Blvd. Fort Eustis VA 23604			11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
			12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.	
13. SUPPLEMENTARY NOTES Copies are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.				
14. ABSTRACT <p>The Matthew Jones House is located on Joint Base Langley-Eustis (Eustis), Virginia. The house is a Virginia Historic Landmark (121-0006) and also listed on the National Register of Historic Places (#69000342). The house is now being used as an architectural-study museum with 90 architectural features labeled as teaching points. The structure illustrates the architectural transition from the post-medieval vernacular to the Georgian style to the Victorian style. All buildings, especially historic ones, require regular planned maintenance and repair. The most notable cause of historic building element failure and/or decay is not the fact the historic building is old, but rather it is caused by an incorrect or inappropriate repair and/or basic neglect of the historic building fabric. This document is a maintenance manual compiled with as-is conditions of construction materials of the Matthew Jones House. The Secretary of Interior Guidelines on rehabilitation and repair per material are discussed to provide the cultural resources managers a guide to maintain this historic building. This report satisfies Section 110 of the National Historic Preservation Act (NHPA) of 1966 as amended and will help the Joint Base Langley-Eustis, Fort Eustis Cultural Resources Management to manage this historic building.</p>				
15. SUBJECT TERMS Fort Eustis, Virginia, National Register of Historic Places (NRHP), cultural resources management, historic preservation, historic building maintenance, Secretary of Interior Standards for Rehabilitation				
16. SECURITY CLASSIFICATION OF: a. REPORT Unclassified		17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 288	19a. NAME OF RESPONSIBLE PERSON Adam Smith
b. ABSTRACT Unclassified		19b. TELEPHONE NUMBER (include area code) (217)-373-5897		
c. THIS PAGE Unclassified				